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APPROACHING BOSTON

BY RICHARD E. DODGE

THE majority of the people who visit Boston at the time of the meetings of the *National Educational Association* in July next, will approach the city from one of three directions:—(1) from the west, (2) from the south and southwest, or (3) by water from the south and east. The view to be seen en route varies strikingly according to the direction from which the visitor comes, as can best be shown perhaps by a brief glimpse at the geography of southern New England.

Southern New England, including Massachusetts, Rhode Island and Connecticut, is a broad rolling plain, lying close to the level of the sea along the coast but rising gradually inland until it reaches a height of 1,200 feet or more in northwestern Massachusetts. From the hilltops this greatly inclined plain is everywhere clearly discernible rolling away to the horizon, and interrupted by an occasional valley or by slight elevations which rise above the upland plain in dignified peaks, like Mt. Greylock in Massachusetts or Mt. Monadnock in New Hampshire. This plain was once a lowland and has been elevated so that its height constantly increases inland. It is a good illustration of a region that has been worn down from some pre-existing land form to a lowland of denudation, or *peneplain*. The residuals rising above it, like those mentioned, are remnants of this old undenuded land area, and are called *monadnocks*.

The increasing elevation inland has allowed the rivers to cut valleys in this plain, with a constant increase in relief upstream from the lower portions. The main valleys run north and south, so that a traveler from the west has to cross alternating highlands and lowlands

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between the Hudson river and Boston. The tributary valleys running into the main streams have a general east and west direction and furnish the easiest means of approach to the highland ridges. The river valleys therefore are occupied by railroad lines and are the busiest centers of trade and industries. The principal north-south rivers are the Housatonic, the Connecticut and the Blackstone. The northern part of southern New England therefore is a rolling upland with steep sides, and generally narrow valleys intersecting the upland, so that the relief is varied and picturesque.

The whole of New England has been glaciated, and the soils have been largely scraped from the highlands and deposited to a depth in the lowlands or left scattered in thin patches on the hilltops and hillsides. Thus the soil of the highlands is thin and relatively infertile while that of the valleys is more valuable and productive. The boulders plucked from the ridges have been left scattered broadly over the land, and are known as "hardheads." In places these boulders are so thick that they allow little room for vegetation, and some regions therefore do not even furnish enough grass for grazing. In other places the boulders have been made into house walls or into stone walls or fences so that the land is comparatively free from large, loose rocks. These stone fences give a picturesqueness to New England that is distinctively its own. They are a monument to the thrift of the early settlers who labored for years to make their land holdings workable. These walls have been built for this reason, and not primarily as boundary lines or for protection.

The glacier pushed to the south until its edge stood off shore, so that its debris was left in the great rolling hills now to be found on Long Island, Block Island, Marthas Vineyard, and Nantucket. As the ice front retreated, accumulations of debris were left in different places, forming the hills of Cape Cod and the elliptical hills or *drumlins* to be seen in such great perfection about Worcester and Boston.

The glacier partially filled the valleys with debris, so that the rivers have since found their way embarrassed. As a result many of the large rivers and nearly all the small ones have many falls along their courses. These falls have been the key to the rapid development of manufactures in New England, because they gave an opportunity for the use of water power, with little expenditure of labor or money. The manufacturing towns of Manchester, N. H., Lowell, Lawrence, Fall River, and Holyoke, Mass., Willimantic, Conn., and many others

almost equally well known are due to the presence of these falls. Even now when steam has so largely taken the place of water as a power, 32% of the power used in cotton manufacturing in New England is obtained from the river falls.

Upstream from every barrier in a water course there is a lake. Lakes are to be counted by the thousands in all the New England states. They are of great value in various ways. Economically they are used as natural reservoirs for city water supplies; they form a reserve supply of water for power in dry seasons; their shores furnish excellent sites for summer homes; or their quiet waters, practically free from strong currents, invite the canoeist and the sportsman to the woods and the delights of wildness. Set amid the dense forests or the green rolling hills, as many of them are, they form objects of great beauty and attractiveness. Their irregular shores furnish examples of many varied coast forms, and their clear waters gleam like gems, bringing out the beauty of the surroundings as nothing but water can.

The coast line of New England is generally irregular. Broad estuaries run far back into the land forming highways of commerce and fishing grounds for many valuable fishes. Northern New England has many deeper and more irregular shore depressions than southern New England. The southern New England coast, however, is everywhere broken into a series of promontories and bays. It is varied in form and in beauty. The bays form good harbors for pleasure craft, fishing boats or large ocean liners, according to their size, and are an important factor in determining the economic condition of New England. If an irregular shore line is an index of the state of advance of a people, New England is a good illustration of such a causal relation between physical and economic geography.

With this glimpse at the general features of the region, let us take up the several routes of travel mentioned above and note briefly the chief points of geographic interest which they present.

1. FROM THE WEST

The larger number of travelers from the West will cross Massachusetts by way of the Boston & Albany or Fitchburg railroads. Either of these railroads is a scenic line and presents many attractive glimpses of highland and lowland. The Boston & Albany railroad crosses the lower Berkshire Hills and the head of the Housatonic valley, and then follows the narrow and picturesque valley of the Westfield river to its

junction with the Connecticut at the thriving inland city of Springfield. The Berkshire Hills are the southward continuation of the Green Mountain range and are renowned for their great beauty and attractiveness. A large part of the Berkshire region to the south of the railroad and bordering the Housatonic river is thickly occupied by the summer homes and estates of New York men, who find this area accessible. The winding, narrow valley of the Westfield contains several small towns nestling among the hills, and the relief here is so strong that the region seems mountainous to the traveler.

By contrast, the open plain-like valley of the Connecticut, as it is seen about Springfield, seems tame and civilized. Here are fine farms, beautiful trees, and an active, busy city, built at the junction of north-south and east-west lines of travel. This point is a natural place for a town and has been an important stopping place during the history of the country.

East of Springfield the country is rolling, but not rugged, and the railroad passes through a succession of cities and rural communities. The influence of soil, slope and water power upon manufacturing and agriculture can be noted constantly. At Worcester, at the headwaters of the Blackstone river, there has naturally grown up the second largest city of Massachusetts and the third city of New England. From the railroad there are many good views of the great lenticular hills or drumlins, which are described in another article. Clark University, of interest to all teachers, can also be seen from the train.

From Worcester east the altitude grows less, and the landscape becomes continually more and more modified by man's efforts, particularly east of the crossing of the Charles river. Through the several Newtons, Allston and Brighton, there is a continual series of artistic stations, well kept grounds, and handsome suburban homes, all of which indicate the near approach of the business center, Boston itself.

The view from the more northern Fitchburg railroad is in some ways similar to that just described, but there are many differences. The traveler entering the state from the West passes through the attractive college town of Williamstown, and sees Greylock, the highest mountain in Massachusetts, just to the south. The Hoosac range lies ahead like a wall, and seems at first to block the way. Built through this range is the famous Hoosac Tunnel, nearly five miles in length, which gives access to the headwaters of the narrow and very winding Deerfield river. This river is followed to Greenfield, which, like its neighbors, Turners Falls and Millers Falls, is a manufacturing town

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situated at the junction of two natural highways of trade and transportation. Like Springfield, Greenfield is an important place, but it is not a rival of Springfield in size or importance, because it is not in touch with as valuable a region.

From Greenfield east, the railroad passes through several small manufacturing towns, and the larger city of Fitchburg. Glimpses can be had of the dignified peak of Mt. Monadnock just to the north in New Hampshire, and of Mt. Wachusett to the south. The journey is however comparatively uninteresting until one reaches Waltham, and passes among the great, busy factories of this world-famous watch city. East of Waltham the train passes through the attractive towns of Belmont and Waverly, and the more populous Cambridge and Somerville. The view to be seen of these two cities is by no means attractive and few points of interest can be noted. The train reaches Boston at the North Union Station, "across town" from the Terminal Station reached by the Boston & Albany railroad.

2. FROM THE SOUTH AND SOUTHWEST

The traveler from New York by train will leave the city from the Grand Central Station, and will pass through a long tunnel which shuts off the view of the central portion of the city. Coming out of the tunnel onto the elevated tracks there is a good view to the west of the many storied apartment houses, of several small parks and of the main cross town business streets. The train crosses the Harlem river, so-called, on a four track bridge, and soon after passes into an open tunnel. Later the road passes by the New York Botanical Garden and along the banks of the small Bronx river, an excellent example of a meandering stream and its relations to human conditions.

The two cities of Mt. Vernon and New Rochelle and several small suburban towns soon follow, and then the traveler approaches the Sound. From this point on the railroad follows close to the ocean and affords frequent glimpses of the many small estuaries used as anchoring grounds for fishing boats and yachts, and of the many rough and wooded peninsulas, most of which are occupied by summer residences. The shore from New York eastward is now practically all used for summer resorts, and some of the residences to be seen from the train are very handsome and attractive. Looking inland the landscape is everywhere rolling, and diversified with ledges and boulders of solid rock. No eminences are to be seen until one approaches New Haven and enters the weak rock area of the central lowland of Connecticut. Above

the lowland rise two sentinel points known as East and West Rocks, bordering the city of New Haven on the east and west. These are formed by the trap rock which composes many ridges in the lowland. Some of these ridges can be followed as far north as central Massachusetts.

At New Haven the railroad branches, and the traveler may follow the lowland to Springfield, from which city the route has been already described; or the Shore Line may be taken, passing to the east close to the shore until Rhode Island is reached, and then across the state to Providence and Boston.

The road up the Connecticut lowland offers a series of fine views of the trap ridges with their wooded tops, steep escarpment fronts, and of the rich lowland between. The route passes through Berlin, with its brick and bridge industries, and Meriden, famous the world over for its Brittania ware. At Hartford, the capital of Connecticut, the road follows close to the capitol grounds and allows a view of the handsome state house. North of Hartford may be seen several thriving manufacturing towns and the canals whereby the Connecticut river water is furnished to the mills. The view of the river where the railroad crosses the Connecticut is also well worth seeing. The increased elevation of the even-topped ridges and the consequent increase in relief along this route, shows clearly the relation of the New England upland to the present drainage.

The route from New Haven along the Shore Line offers a continuation of the same alternation of estuaries and promontories already noted. The views along this route are more varied than those along the Springfield line, but one does not get as good a glimpse of the upland. Everywhere there is lowland but slightly diversified by elevations or depressions.

The chief cities on the route are New London and Providence, large manufacturing towns and termini of steamship lines to New York, and Pawtucket, a large manufacturing city close to Providence. Providence is famous especially for its silverware, but no idea of this industry can be gained from the train. The route from Providence to Boston is through a pleasant, but generally sandy country, which shows very clearly the character of this low portion of the New England plain already described.

3. BY WATER FROM THE SOUTH AND EAST

The route by water from New York or the South is well worth taking by all who can arrange to do so, for it offers many glimpses of

the rolling green shores of southern New England and its neighboring islands, and allows one to see Boston as a whole, skirting its beautiful harbor and spread over the many hills and lowlands. There is no better way of seeing the general relations of Boston to its surroundings and no other way of really appreciating the sea conditions that have made this one of the leading commercial cities of the nation. A later paper describes the features of the harbor, which give it a beauty not to be found in the other harbors of the Atlantic coast, except perhaps the one at Portland, Maine.

THE GENERAL GEOGRAPHICAL FEATURES OF BOSTON AND VICINITY

BY PROFESSOR GEORGE H. BARTON
President of the Appalachian Mountain Club

BOSTON, the capital of the "Old Bay State," and the largest city and principal seaport of New England, lies at the head of Massachusetts Bay which forms an indentation along the central part of the eastern coast of the state.

Massachusetts Bay, and Cape Cod Bay directly to the southeast, including the waters between the two salient points of the coast line, Cape Ann and Cape Cod, form the southwestern extremity of that body of water which is sometimes known as the Gulf of Maine, and which has the Bay of Fundy for its northeastern extremity.

Cape Cod Bay is more than three fourths enclosed by the mainland and the long arm-like extension of Cape Cod, but its shores are low and sandy, and its harbors are small, shallow, and poor. Massachusetts Bay is broadly open to the ocean, but most of its coast line is bold and rocky, with numerous jutting headlands, many of which enclose good but small harbors. Such are the harbors of Gloucester, world famous for its fisheries, of Salem, of Marblehead, and of Lynn. South of Boston the coast at Cohasset is rocky, but there are no indentations of sufficient size for harbors. Boston Harbor is finely sheltered, though directly facing the open sea. From the main coast line at the northward the long peninsula of Winthrop extends southeasterly, and with the very slight break of Shirley Gut is continued by Deer Island in the same direction. From the south shore the long narrow peninsula of Nantasket and Hull projects northwesterly directly toward Winthrop till the two approach within about four miles of each other. Directly

within the intervening space lie several large islands, Lovell, Long, and Georges, as well as a number of smaller ones, while just outside and almost opposite the entrance, like protecting watch-dogs, lies another group of islands, containing the Brewsters, the Graves, and others. These together enclose the greater or outer harbor, affording abundant protection against the severest storms.

Within this larger harbor, the harbor proper lies, bounded on the north and south by the small headlands of East Boston and South Boston respectively and protected from the outer harbor by Governor's Island and Castle Island.

Few harbors are more picturesque than that of Boston, and in passing it is of interest to note that the greater number of the islands owe the principal part of their size and all of their beauty to the accumulations of the Glacial Period, being mostly drumlins, or combinations of several drumlins. Previous to the Glacial Period, these hills and the principal islands of the harbor were lacking in our landscape, and the harbor had not then its present beauty.

The debris produced through the action of the waves, in wearing away the whole or portions of the drumlins, has furnished sand for the waves and currents to build up the long, low, flat necks of land which connect many of them together. This is especially well shown at Nantasket and Hull, in Revere Beach, and in Lynn Beach which joins Nahant to the mainland. This debris has also produced the fine bathing beaches of which these are all good and now famous examples.

Three rivers empty into the waters of the larger harbor, but all are comparatively small, the extreme headwaters of the larger taking their rise within thirty miles of its mouth.

The Mystic, which drains the country to the north and northwest, is very short, its extreme length being not over fifteen miles. It has one large tributary on the north, Malden river, and it drains a series of beautiful small lakes, or ponds as they are termed in New England, the chief of which are Spot Pond in Stoneham, Fresh Pond in Cambridge, Spy Pond in Arlington, Horn Pond in Woburn, and the Mystic Lakes in Medford and Winchester.

The Charles*, the largest of the three rivers draining the country to the west and southwest, has a very winding course, and though rising in Hopkinton, at a distance of less than thirty miles from its mouth, it has a length, through its various meanderings, of sixty-nine

*See "The Geological History of the Charles River," by Frederick G. Clapp, *Tech. Quar.*, 1901, Vol. XIV, pp. 171-201, etc.

miles. In general it flows through a flat, open country, but there are many picturesque features along its course. Hemlock Gorge in Newton is a beautiful, romantic spot which has been reserved as a part of the Metropolitan system of parks. On the banks of this river are situated many manufacturing establishments, the most important of which is the watch factory at Waltham. Dedham, Newton Upper Falls, Newton Lower Falls, Newton, Auburndale, Waltham, Watertown, and Cambridge are important places situated along its course. Longfellow, who looked upon its winding course through the broad marshes near

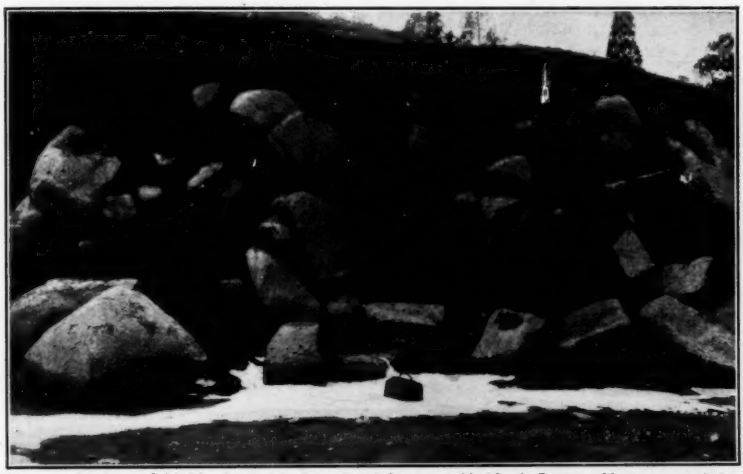


FIG 1. *A mass of highly decomposed rock (diabase) at Medford Centre, Mass., containing residual boulders in situ, which was not swept away by the ice-sheet. This is one of a few exceptional cases of chemical erosion. The whole shows every step in gradual transition from fresh, unchanged rock to fully formed soil.*

Cambridge, has immortalized it in his verses. The Longfellow Park still preserves unbroken the view from the windows of his former mansion to the river which he so well loved. The Charles and the Mystic unite and flow into the harbor as one stream between Boston and East Boston.

These rivers are both navigable in the lower parts of their courses, the Mystic as far as Medford, and the Charles as far as Watertown.

The Neponset, which drains the country to the south and empties into the southern portion of the harbor between Quincy and the Neponset district of Boston, is intermediate in length between the Mystic and the Charles. For many miles above Readville and Hyde Park it flows

through a very extensive marsh, probably caused by the damming back of its waters owing to the deposition of materials along its lower course during the Glacial Period. Tributary to the Neponset are Massapoag Pond in Sharon, Reservoir Pond in Canton, and Ponkapog Pond in Randolph. The villages of importance along its course are Hyde Park, Mattapan, Milton Lower Mills, and Neponset.

The surface features of eastern Massachusetts are due to the effects of pre-glacial erosion, modified by the erosive action of the great ice-sheet during glacial times, and to the distribution and deposition of materials by the direct action of the ice-sheet and later by the waters produced by its melting. The pre-glacial characteristics of the surface are best retained and shown in the region north of a line drawn inland from the coast at Lynn to Waltham, about twelve miles directly west of Boston. Here, from a region of considerable width, mostly composed of crystalline rocks, the ice-sheet swept clear nearly all the decomposed and loosened materials, leaving a large proportion of its surface as bare rock or coated with a very thin layer of debris. (See Fig. 1.) The whole region is hilly, the general elevation of the higher summits being from 200 to 300 feet above sea-level. Along the southern margin of its higher summit, Arlington Heights, 370 feet in altitude, affords a fine view of the country on the north side of Boston. A large area, distinctly wild and picturesque, lying between Melrose and Winchester has been reserved as a part of the Metropolitan Park System under the name of the Middlesex Fells. Many of the villages of this region nestle in the larger valleys cut through these hills—such are Lexington, Winchester, Woburn, Stoneham, Melrose and Wakefield—while just at the foot of the southern slope of this highly dissected plateau are situated the villages of Waltham, Belmont, Arlington, West Medford, Medford, Malden, Linden, Saugus, and Lynn. In a region of such slight elevation as this it is of great interest to note how fully the distribution of the population is determined by the prevailing topography. The slope with which these highlands terminate at the south is steep and well marked throughout nearly its full length, while it often nearly forms escarpments. The elevations throughout the area whether small or large are distinctly of the *roché moutonnée* type in outline in variable degrees of perfection. Their summits are always well rounded, while their northern slopes are often beautifully polished, and covered with striae or plowed with deep furrows. Arlington Heights, on a broad scale, and the hill just northeast of Malden village, are fine examples of this kind.

Stretching southward from the southern margin of the above area and extending to the Blue Hill range lies the generally low plain of the Boston Basin, though dotted with numerous elevations which are usually not of rock but due to glacial accumulation. Very much of this area, especially on the north, just reaches, or is slightly above sea-level. Broad areas of salt marshes extend along the coast from Lynn through Revere into Winthrop and reach westward to the village of Linden. Other and smaller areas lie along the Mystic and its tributaries, along the Charles where, between Cambridge and Brighton, they have recently been reclaimed from the higher tides by extensive dikes and now furnish beautiful drives and an extensive park, and also along the lower course of the Neponset. A broad area of swamp or very low land lies along the line of the Fitchburg division of the B. & M. R. R. between Fresh Pond and Spy Pond in Cambridge, Belmont, and Arlington. Other large areas, not above 40 feet in elevation, lie in various parts of the basin and are extensively built upon. Could the glacial drift be removed from this basin, which is bounded on the west by Prospect, Bear and Doublet Hills in Waltham and Weston, a large portion of the territory would be covered by the waters of the present sea. During the Carboniferous Age this basin, hollowed out of the older crystalline rock, was filled by the waters of an extension of the sea, in which were laid down sediments that now form the slates and conglomerate which underlie the accumulations of the drift. The present basin-like depression in the general topography of the country is due more to the rapid wear of these softer rocks than to the surrounding crystallines. This is more strongly evident in the slate areas at the north than in the conglomerate areas at the south. In but few instances does the rock in either rise to any great height above sea-level. The hills of the basin are principally drumlins and will be discussed below.

The most marked feature in the topography of the coastal area of Massachusetts is that known as the Blue Hill range. This consists of a nearly linear though slightly curving range of hills of varying heights extending generally in an east-west line, but at its eastern extremity curving to the northeast. The extreme length of the range, considering the hills of Quincy as essentially a part, is about six or seven miles. Its highest eminence is the Great Blue Hill, the extreme western summit, 635 feet in altitude above sea-level, which is the highest elevation on the Atlantic coast south of Green Mountain, on the Island of Mt. Desert, on the coast of Maine. Holding this peculiar relation,

it has served as an admirable site for the Blue Hill Meteorological Observatory, established some years since by Mr. A. Lawrence Rotch of Boston. The other summits, lying to the eastward, are Hancock Hill, 550 feet, Bear Hill, 500 feet, Chickataubut, 500 feet, and many lesser summits from 200 feet, as those at Quincy, to 300 and 400 feet. All are well rounded summits, smoothed and furrowed on their northwestern sides, with steeper and more ragged slopes on the southeast. Seen from the north and northeast the *roché moutonnée* outline is fairly well defined. Deep valleys intersect the main range at two points, one southeast of Hancock Hill and a second between Bear and Chickataubut. Through these run the main highways of the country, at elevations of 240 feet above sea-level in each case, or 310 feet below the summit of Hancock in the one case, and 300 below the summits of Bear and Chickataubut in the other. These highways, together with the one passing just west of the Great Blue Hill, furnish very pretty drives.

Next to the Blue Hills in elevation is Prospect Hill, at the northwest of the village of Waltham, which rises to an altitude of 460 feet. From the summit of this eminence there is obtained a fine view of all the surrounding country, including the northwestern portion of the Boston Basin. This hill forms a fine example of the *roché moutonnée* type, with long, very gentle, and smooth slopes to the north and northwest, and steep, precipitous slopes on the south and

FIG. 2. *A drumlin of the typical Massachusetts form near Groton, Massachusetts. This is an exceptionally fine example.*

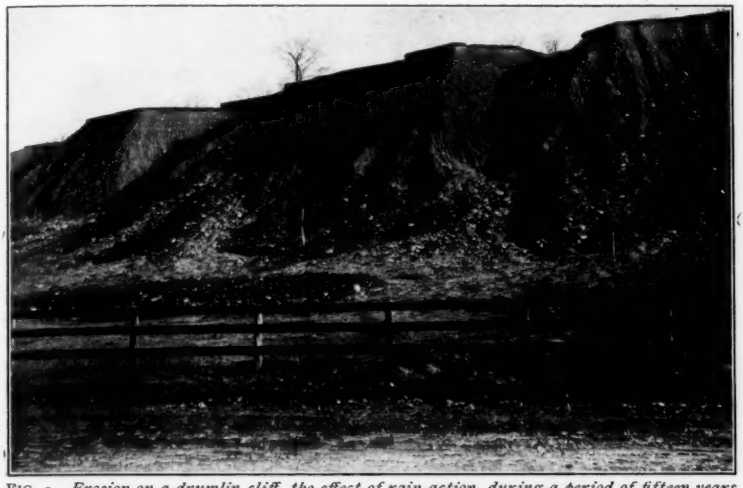


FIG. 3. *Erosion on a drumlin cliff, the effect of rain action, during a period of fifteen years. This is a vertical section of an artificial excavation in the northwest end of Parker Hill, Roxbury, Massachusetts.*

southeast, often accompanied by piles of talus and huge angular blocks. No better example for class study of this type is found near Boston. Doublet Hill, three miles to the south, 360 feet in altitude, furnishes from its summit an exceptionally fine and picturesque view of the winding Charles, which flows directly at its eastern base.

The great ice-sheet of the Glacial Period, in its direct action and through the action of the waters produced by its melting, furnished our landscape with a diversity of topographic forms, major or minor as the case may be, which in general add a great beauty to its original appearance. The more prominent among these is the drumlin, or lenticular hill as it was called by the New Hampshire State Geological Survey, which, with its smooth, flowing outlines, long, gentle slopes on the ends, and somewhat steeper slopes on the sides, is at once the most symmetrical and the most graceful hill that Nature ever produces. (See Fig. 2.) These have already been spoken of as forming the larger number of the islands and the most picturesque features of Boston Harbor, and they also form the larger number of summits within the limits of the Boston Basin, while in the highlands outside the Basin they are almost if not entirely wanting. On the northeast, the hills of Revere afford fine examples, and before the recent excavations along its sides, Breed's Hill, just beyond East Boston, would have been selected as a type form.

Practically all the hills within the limits of the city proper, of East Boston, of Chelsea, Everett, Somerville, Cambridge, and Watertown, including the site of the Soldiers' Home in Chelsea, of Tufts College in Medford, the famous Bunker and Breed's Hills in Charlestown, and of Beacon Hill in Boston, are drumlins. South of the Charles, fine examples are seen in Parker Hill in Roxbury, (See Fig. 3.) Corey and Aspinwall Hills in Brookline, and very many in Brighton and Newton. Still farther south the hills near Roslindale and West Roxbury, the higher summit of Bellevue Hill, with Clarendon Hill, and Forbes Hill in Quincy are other examples. Rising in general to altitudes varying in from 200 to 300 feet, they compete with all but the higher of the rock hills surrounding the Basin, and they relieve the Basin from the low monotony of surface that would otherwise prevail over a large part of its extent.

Of the minor topographic forms, the most interesting and attractive as well as perhaps the most noticeable, are the long, winding, serpentine ridges of gravel and sand, the accumulations in the beds of streams flowing upon or underneath the ice-sheet during the period of its melting. Many of these ridges, to which the name of *esker* is now more generally applied in place of the former designation of *kame* by which they were long known, exist in various parts of the country around Boston. The best and most easily accessible examples, however, are in Newton. At Auburndale, one runs southerly from near Lasell Seminary to the neighborhood of Newton Lower Falls, a fine characteristic ridge, rising in some places to an elevation of 60 feet above the general level of the surrounding country. A section of its internal structure is exposed where it is cut through by the Brookline Circuit Branch of the B. & A. R. R., not far southeast of Riverside station. About three miles east of this another of these ridges, though not quite so perfect an example, runs from near Newtonville toward Newton Center, terminating in the very perfect delta formed at the mouth of the glacial stream. This delta, the broad sand-plain northwest of Newton Center, shows a very perfect northern border, with a steep slope. It has a nearly straight east-west line where it was in contact with the southern margin of the ice, about three-fourths of a mile north of Newton Center, and a fine lobate southern border along the street running from Newton Center to West Newton. No better example of a glacial stream delta for the purposes of class teaching is found near Boston, and this is constantly utilized for the purpose. The studies and publications of Professor W. M. Davis of Harvard

University and his students have rendered this particular esker and sand plain classic examples of their types. A fine series of eskers can also be seen crossing the Charles river west of Waltham, which, continuing southerly, are connected with one at Auburndale. (See Fig. 4.)

The small and large streams flowing through the highlands outside the Basin are usually bordered on each side by terraces, the narrow or broad remnants, as the case may be, of their flood plains during the waning of the ice-sheet re-excavated by the later streams. One fine example for easy inspection is in the valley of Stony Brook in Weston, a few miles west of Waltham on the line of the Fitchburg R. R.

FIG. 4. *A Kame Esker or Osar, crossing Charles River, and disappearing below the surface of the water, near Roberts Station on the Fitchburg Railroad, Waltham, Massachusetts.*

The old pre-glacial valley has been largely cleared of its detritus of glacial times by the present stream, leaving a narrow marginal area along the sides which, just opposite Kendall Green and Hastings Station, forms a typical example for class instruction.

Another minor but very interesting type of form is shown in the small terminal moraine, consisting principally of an accumulation of boulders, along the southern slope of Arlington Heights not far below the summit, and extending for perhaps a half mile in well defined outlines, and for a half mile further in more indefinite form. Most of the lakes of the region are kettle holes in origin or formed by the damming of natural drainage lines by glacial detritus. Of the former, Fresh Pond in Cambridge is a fine example.

The present city of Boston comprises the old Boston, or city proper, and several districts which were formerly separate towns but have been annexed to the city at various periods during its later history. Of these, East Boston, formerly Noddle's Island, and Charlestown, on the north, and South Boston on the east are entirely separated from the city proper and from each other by water, and are connected only by means of bridges or ferries. Dorchester, Roxbury, and West Roxbury on the south, are closely connected with each other and the city. Brighton, at the west, is almost surrounded by other towns or cities, and is only connected with the main portion of Boston by a very narrow strip along the south side of Charles river. Roxbury and the city proper were formerly connected only by a long, narrow neck of land along the present line of Tremont and Washington streets. This former neck has been so far widened on both sides by filling up the water areas, that it is now a part of the widest portion of the city. The former city proper has been very much enlarged beyond its original area by filling portions previously covered by water. A large portion so reclaimed from the expanded part of the Charles river, know as the Back Bay, now forms the principal portion of the chief residential section of Boston, and retains in its built-over condition the name of Back Bay. This comprises nearly all the area lying between Charles street on the north, Tremont street on the east, and the village of Longwood on the southwest. The principal shipping by water is confined to the east and north sides of Boston proper, to the southwestern sides of East Boston, and to the southeastern side of Charlestown.

EXCURSIONS IN AND AROUND BOSTON

BY CHARLES F. KING
Of the Dearborn School, Boston

BOSTON, built upon an enlarged peninsula which protrudes somewhat into the Atlantic Ocean, lends itself readily to excursions by land and by sea. On account of its age and early importance as a center, it provides numerous excursions to historical spots, and plenty of trips can be taken to study geography or for pleasure alone. In fact there are so many attractive trips from Boston that the writer is embarrassed in making a fair selection and pronouncing them the best.

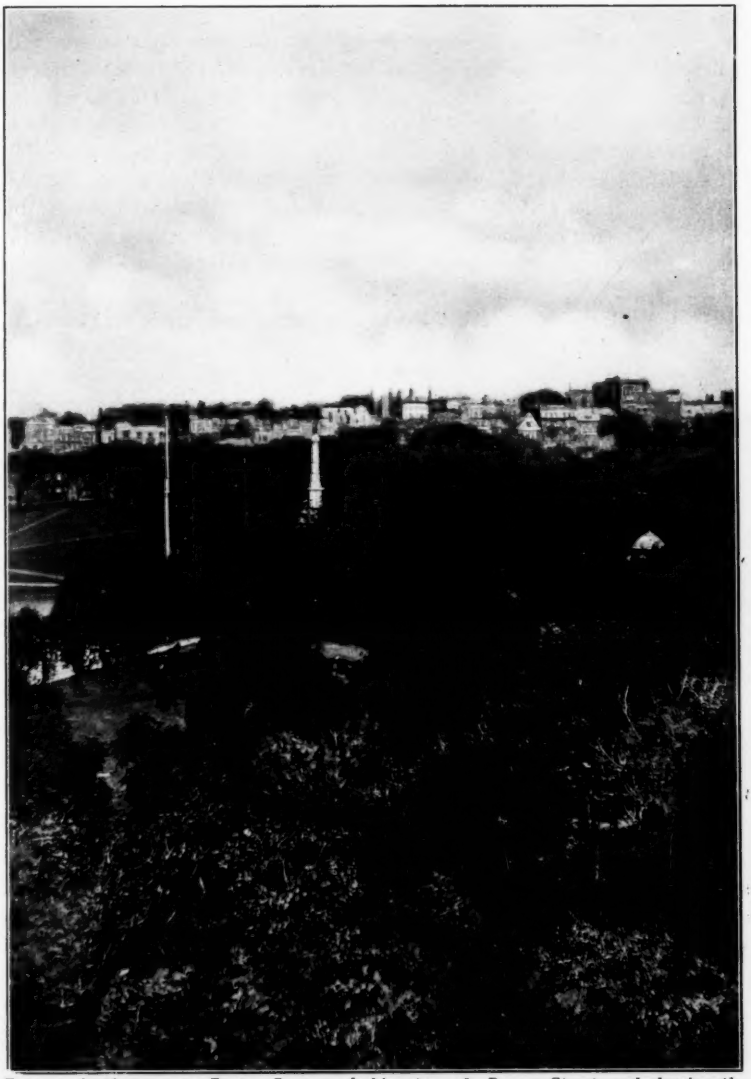


FIG. 1. *A glimpse over Boston Common, looking towards Beacon Street, and showing the Soldiers' Monument.*

In order to help those readers who may become visitors, he classifies the excursions in two ways: first, in reference to means of transportation; second, in reference to purpose and scope. This may necessitate a little repetition but the end may justify the means.

When transportation is considered, nearly all the excursions fall under four heads: Excursions on foot, by trolley (including the Elevated R. R.), by steamer, and by steam cars. Many of the trips by trolley can also be taken by steam cars, but on a warm day in summer, a ride for two hours in an open car is usually preferable to the shut-in steam cars.

If Boston is the "Hub," then the center of this hub is the Common, and from its Park street corner we will always start on our trips.

A visitor will naturally walk first down Winter or Bromfield street to the Old South Church on Washington street. A huge steel structure is rapidly going up around it as a background, but the church remains untouched. Its preservation is due to the generosity of a woman, Mrs. Hemenway. In this church were held several patriotic town-meetings, and from it the "Tea Party" started for the ships. Here Warren delivered his great oration in the presence of the British officers. The church is now used as a historical museum.

A little farther north on Washington street, stands the Old State House in which Adams, Otis, Warren, and Hancock made the first opposition to royal authority. This building contains, on the second floor, many rare paintings, prints, books, and relics of colonial and provincial periods.

Nearly opposite the Old South on Milk street is the site of Franklin's birthplace. Quite near the Old South, on Washington street, still stands the "Corner Bookstore," where Field and the famous writers for the Atlantic Monthly met for business or pleasure.

Passing a little farther down Washington street, Adams Square is reached. This leads to Dock Square on the right, the great market section of Boston. In the midst of these markets stands Faneuil Hall, the "Cradle of Liberty." The city has recently renovated the interior, but it is a lasting shame that markets are still allowed under this historic structure.

A short walk through Hanover street brings one to the "North End" and to Hull street, on which stands "Old Christ Church" where some say the lanterns were hung as signals for Paul Revere. Copp's Hill cemetery is on the same street. From this point the British set fire to Charlestown at the battle of Bunker Hill.

XUM

We return now to the Common. (See Fig. 1.) On the way, we pass by King's Chapel on Tremont street, which is as full of Tory memories as the Old South is full of patriotic ones.

At the upper end of Park street, on Beacon, opposite the Common, glows the golden dome of the State House. The first floor is well worth visiting, and a grand view of the city and harbor can be obtained from the cupola.

At the upper Park street corner of the Common, is the Shaw

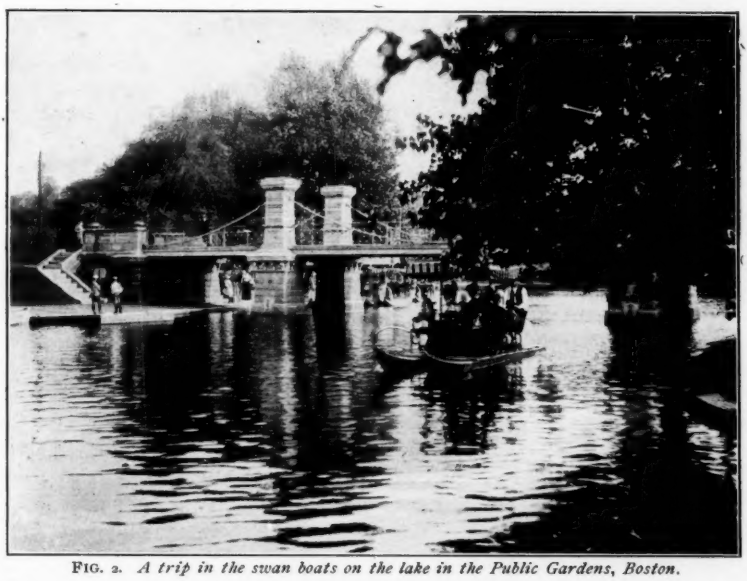


FIG. 2. *A trip in the swan boats on the lake in the Public Gardens, Boston.*

Monument, framed by two massive English elms, and telling, as only genius can tell it, a great story in lasting bronze. Near by, on Park street, is the house once occupied by George Ticknor, where Lafayette lived when in Boston in 1824.

Next to the State House on Beacon street, now No. 29, is the site of the "Hancock House." Prescott wrote his "Conquest of Peru" and "Philip II." at No. 55, and No. 296 was for many years the home of Dr. Oliver Wendell Holmes. At No. 148 Charles street is the former home of James T. Fields.

We have passed along the northern side of the Common. Let us retrace our steps, and stop at the Frog Pond, near which once stood

the "Liberty Elm." On the hill overlooking the pond is erected the Soldier's Monument, a structure of great beauty and symmetry, designed by Milmore, the sculptor.

Charles street separates the Common from the Public Garden. (See Fig. 2.) In the latter are many statues in honor of Boston's great men or those connected with the past history of the country. The equestrian statue of Washington by Thomas Ball is a masterpiece. All the work upon it was done by home talent.

Opposite this statue begins Commonwealth avenue, thought by many to be the finest street in America. Leaving this avenue at Dartmouth street, one soon reaches Copley Square, which is bounded by four noble structures. The attention is at once fastened upon the most imposing of these, Trinity Church. It was built in honor of the great preacher, Phillips Brooks, whose eloquence and personal magnetism filled the great building to overflowing Sunday after Sunday.

On the south side of the Square stands the Museum of Fine Arts, containing a rich collection of ceramics, statues, and paintings. The Egyptian room is well worth seeing.

On the opposite side of the Square from the church is the Public Library, a very plain building holding already over a million books. If plain on the outside, it is beautifully and tastefully decorated within. The grand staircase will compare favorably with any staircase in Europe. The mural decorations in the hallway are by the famous Puvis de Chavannes and show the best of taste and great strength and simplicity. In the delivery room at the head of the stairs are Abbey" richly colored paintings of the story of the Holy Grail. On the third floor can be seen the work of Sargent, the great portrait painter.

Near Copley Square on Boylston street, are the buildings of the celebrated Massachusetts Institute of Technology.

Among the trolley excursions we select for short rides, Bunker Hill, the Marine Park in South Boston, Franklin Park in Roxbury, the Arnold Arboretum in Jamaica Plain, Chestnut Hill Reservoir in Brighton, Harvard University and Mount Auburn in Cambridge.

For longer trolley rides, we recommend tours to Lexington and Concord, to the Blue Hills through Hyde Park, to Norwood, to the Middlesex Fells in Malden, and through the Blue Hills to Randolph. Most of these trips begin in the Subway at Park street station, where obliging officials can supply needed additional information. Nearly all parts of Massachusetts are now reached by trolley lines, and it is possible to ride from Boston to New York on the "broomstick train."

The most popular excursions by steamer are down the harbor to Nantasket, or to Nahant, Gloucester, or Plymouth.

Steam cars run frequently from the great South Terminal to places south and west of Boston. Trains leave the North Station for the north and east. At the latter station excursion tickets at reduced prices to places beyond the state can be bought in summer.

These attractive excursions in and about Boston may now be considered in reference to their purpose. We will first briefly refer to those pertaining especially to geography.

Franklin Park offers excellent opportunities for elementary field work and a study of simple type forms, as the land is undulating and

FIG. 3. *A picturesque outlook in Franklin Park, Boston.*

wooded, and the Blue Hills, seen from several points, serve for a chain of mountains. On the west side of the park are plenty of evidences of glacial action. (See Fig. 3.)

The Arnold Arboretum and Hemlock Hill in its southern section, supply slopes, running brooks, winding valleys, the weathering of rocks, and small river basins. There is no better place in the state for a careful study of New England trees. (See Figs. 4 and 5.)

Massachusetts is once more becoming a ship-building state. The most interesting plant of this kind is found at Quincy Point. It is reached by going from Dudley Street Terminal Station by trolley to Neponset, there changing cars for Weymouth Landing, leaving

the car at Newcomb Square. Time, a little over one hour from Dudley Street.

A five-minute walk from Newcomb Square brings you to the Fore River Engine Works, in which great battle-ships, cruisers, and torpedo boats are constructed. The man in charge of the office will give you a pass which will admit you and your guide to the shipyard.

On the grounds are several low wooden buildings painted dark gray and numbered in white. The first building reached is the power house, in which are the dynamos for generating the electricity used in different parts of the immense yard. A short distance away are the forging shops, in one of which is the great iron hammer run by electricity. In the machine shops, the iron work used in the different parts of the ship is prepared. The great smokestacks are made here and afterwards placed in position in the ship.

More interesting than the shops are the battleships in process of construction. The "Rhode Island" and the "New Jersey" are now being built and will be ready to launch in a year. The heavy parts of the ships are carried where they are needed by an overhead electric crane. The car of the crane holds a man to direct it along the tracks to the point over which its heavy burden is needed. When this is reached, the load is dropped into position. Such a crane saves the labor of many men.

From this yard the cruiser "Des Moines" was launched last year, and now lies in the river receiving her machinery. The largest schooner afloat, the seven-masted "Henry L. Lawson" was made here, and now a six-masted steel ship is being built. Over two thousand men are working on these vessels. (See Fig. 3, page 321.)

Boston and vicinity are rich in places of interest to the teacher of physical geography. South of Boston are the Blue Hills. Great Blue Hill stands six hundred and thirty-five feet above sea level and is the highest land on the Atlantic coast from Maine to Florida. The Blue Hills belong to the Metropolitan Park System, but a part of the summit of Great Blue Hill, on which is located the Meteorological Observatory, was leased a few years ago from the Commonwealth by Harvard College for ninety-nine years. The Observatory is open to visitors. From Great Blue Hill a view can be obtained sweeping to Cape Ann, forty miles distant, and to Mt. Monadnock, sixty miles distant. This view reveals many facts that will be appreciated by those interested in geography. It shows a country far from level, and illustrates the fact that the valleys are the great centers of habitation. One of the best places in

XUM

FIG. 4. *In the Arnold Arboretum—"And this our life, exempt from public haunt, finds tongues in trees, books in the running brooks, sermons in stones, and good in everything."*

which to study the wearing away of a drumlin by the action of the waves is at Winthrop Beach or Winthrop Head, reached by the narrow gauge railroad on Atlantic avenue. Boston teachers often take classes there. (See Figs. 6 and 7.)

A very enjoyable and instructive trip is one to Marblehead Neck. This rocky coast is composed of several varieties of volcanic rocks. The beaches between the headlands are covered with pebbles formed from the grinding up of these rocks. Diabase dikes are of very frequent occurrence in the granites, and in many cases have been worn away by the force of the waves. One such place is called the "Churn," on account of the sound made by the water rushing in at high tide. The spray is sometimes thrown to a great height. This is one of the finest places to study marine erosion, as Marblehead Neck is exposed to the attacks of the open sea.

A slate quarry can easily be studied at West Somerville. Joint structure is very finely developed. The slate is divided by these joints into different shaped polygons almost as perfect as if made by a mathematician.

One of the oldest granite quarries in the country is at Quincy. The most important quarries are just west of the West Quincy Station, and on North Common Hill, a mile east of the station. The most interesting feature is the joint structure which is such a valuable aid in quarrying, as the workmen drill holes for the gunpowder which breaks the granite from one to another of these cracks. Quincy granite was used more than two hundred years ago in Boston, in buildings which are still standing. It is shipped to other large cities of the United States. Several of the government buildings at Washington were built of this stone.

By taking train to Lynn and a barge from there to Nahant, returning thence by boat to Boston, a trip may be had both for pleasure and instruction. The beach connecting Lynn and Little Nahant is of recent origin, and is building now. At low tide along this beach can be seen fine illustrations of ripple marks, rill marks, and trails of organic life. Little Nahant is composed of the volcanic rock syenite, with many intrusions of diabase dikes. There is a rocky beach between Little and Great Nahant which shows all the steps between large angular rock fragments and well-rounded pebbles. Farther back on the beach are large angular blocks which have been swept there by the waves during heavy winter storms. Great Nahant once consisted of two islands, and swampy land now marks the position of the old strait.

The volcanic rock of Great Nahant is diabase which covered beds

FIG. 5. *The winding brook which flows through a little vale in the Arnold Arboretum, Boston.*

of limestone. The limestone outcrops in a number of places. In this limestone are found fossils of Hyolithes. There is quite a marked contrast here shown between the effect of the wave action on volcanic rocks and sedimentary rocks. The volcanic rocks are well-rounded, while the sedimentary ones are still angular and rough. The sea has formed a bench on the north side. Following southward from this place along the cliff walk, and crossing a shingly beach, one of the best caves along the coast can be reached. There is Swallow's Cave, and can be entered at low tide only. It is a long tunnel, narrow and high, on the floor of which are several tidal pools. This is a good place to collect star fish and several other forms of marine life.

In Medford, there is a large diabase dike, which is of particular interest on account of its concentric weathering. On the sides of the cliff, there are all stages of the rock from the hard compact boulder to the finest gravel. Amateur photographers can secure good pictures showing the concentric peeling.

There are numerous historical excursions besides those already mentioned. One of the nearest ones is by the Elevated Road to Thompson's Square in Charlestown to visit Bunker Hill Monument, where Warren fell in the first great battle for liberty. The view from the top of the monument well repays one for the climb. Before returning to the city, visit the U. S. Navy Yard near by, and pay your respects to the old ship "Constitution."

Another short excursion is to the university town of Cambridge, on the Charles river. This river is crossed on the way to Harvard Square near the college grounds, where we stop. The especial points of interest here are the old and the new dormitories, the new Harvard Union Club building, the Fogg Art Museum, the new Germanic museum, and Memorial Hall, where a thousand students regularly take their meals. Back of this hall is the Agassiz Zoölogical Museum, containing the wonderful collections of the master teacher. In the same building will be found the glass flowers "made in Germany" which one never tires of examining.

Opposite the college grounds is Cambridge Common, and west of that the famous Washington Elm. A little farther away from Boston, on Brattle street, is the Longfellow home. On the opposite side of the street is the Longfellow Park, leading down to the Charles river, and the Charles Embankment recently laid out by the city of Cambridge. Farther along on Brattle street is Elmwood, the birthplace and residence of Lowell, who died there in 1891.

FIG. 6. *The beach at Winthrop Head, near Boston, showing the wearing away of the drumlin by the action of the waves.*

FIG. 7. *School children on a visit to Winthrop Beach. The tide is out and small shell-fish, sea grasses, and sea moss are found in large quantities.*

Brattle street leads to Mount Auburn, where are buried many of the country's famous men and women. A map can be purchased at the entrance which will help the visitor to find the graves of notable persons. The view from the top of the observatory is charming.

The most delightful excursion of all, and one needing a whole day, is to follow the British Army on their way from Boston to Lexington and Concord. This is possible now in a pleasant trolley ride. Take a car at the Park Street Station for Arlington Heights. This car crosses the Charles river not far above the place where the British crossed, and passes through Cambridge and on towards Lexington. Cars are changed at Arlington Heights for the Lexington line. Lexington cars can also be taken at Sullivan's Square, in Charlestown. Leaving the car at the Lexington Common, examine the points of interest there, and then visit the Clark House, a few minutes' walk down a side street. This house is full of Revolutionary relics. In the Town Hall are many interesting things to see. (See Fig. 8)

Every half-hour a trolley leaves Lexington near the Common for Concord. There is so much to see in this town and the places are so far apart that it will be wise to engage at the end of the route a carriage furnished by reliable parties at a fixed and reasonable tariff. The driver is usually an intelligent guide. The great historical points here are the Battle Ground and Monument, Wright's Tavern and the Museum. The

literary places are the "Old Manse" near the battle field, Hawthorne's other house in Concord, the Emerson and Alcott houses, and "Sleepy Hollow Cemetery." The steam cars can be taken for the return trip. (See Figs. 9 and 10.)

Next to Concord in historical interest will be the Plymouth trip taken either by steamer from Atlantic avenue, or by steam cars from the South Station. The trip by trolley also is strongly recommended by those who have enjoyed it. Time by trolley, seven hours; by railroad, two hours. In Plymouth, the visitor naturally goes first to Plymouth Rock and then climbs Burial Hill to see the graves and to look out upon the harbor. The National Monument is at the other end of the town. This is often called the Faith Monument, from the large figure of Faith resting on the pedestal. Plenty of time should be given to the Pilgrim Museum, by far the most interesting collection of relics in the state.

Salem combines in a most happy way both historical and literary attractions. In the Peabody Museum near the station on Essex street, is one of the finest collections of rare treasures from all parts of the world. Essex Institute near by contains a rare historical collection. On the grounds is preserved the first Protestant meeting-house built in this country. Roger Williams preached in this church. Its size will

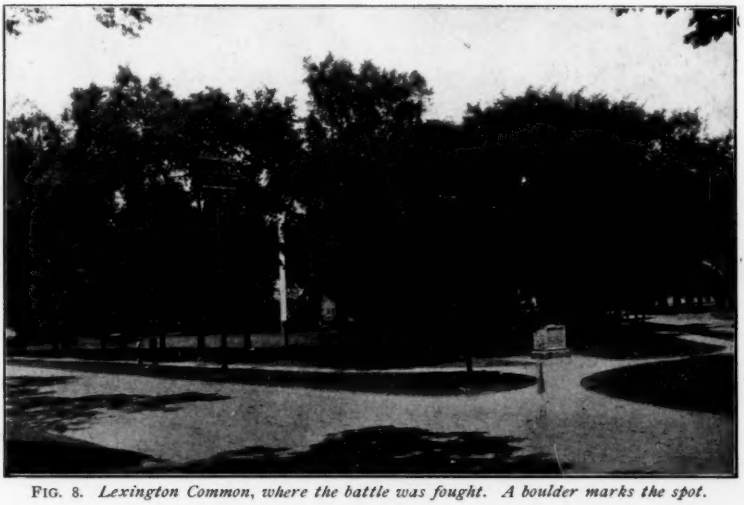


FIG. 8. *Lexington Common, where the battle was fought. A boulder marks the spot.*

attract attention. On Gallows Hill, reached from Hanson street, can be seen the exact spot where nineteen persons were executed for witchcraft in 1692.

Prescott, the historian, was born in this city, and the Storys lived here. Here Nathaniel Hawthorne resided for a time, and in this city the timid young man found his life companion. On Mail street is the house where he wrote "The Scarlet Letter." "The House of Seven Gables" is still standing. In the southern part of the town is the building and home of one of our best Normal Schools.

There is only space left to say under the head of *excursions for pleasure* that nearly all those already described are taken again and again by

FIG. 9. *Looking down Main Street in Concord.*

Boston people in the warm summer months for mere enjoyment. Canoeing on the Charles river is very popular. Riverview near Waltham is one of the starting points for such a trip. (See Fig. 11.)

If one desire life on or near salt water, he can then select the South Shore trips to Nantasket with a ride on the Jerusalem Road, to Plymouth, Newport, Cottage City, Nantucket, or Cape Cod. On the North Shore are located Nahant, Revere Beach, Swampscott, Marblehead

FIG. 10 *The Battle Monument on the Concord battlefield.*

"By the rude bridge that arched the flood,
Their flag to April's breeze unfurled,
Here once the embattled farmers stood,
And fired the shot heard round the world."

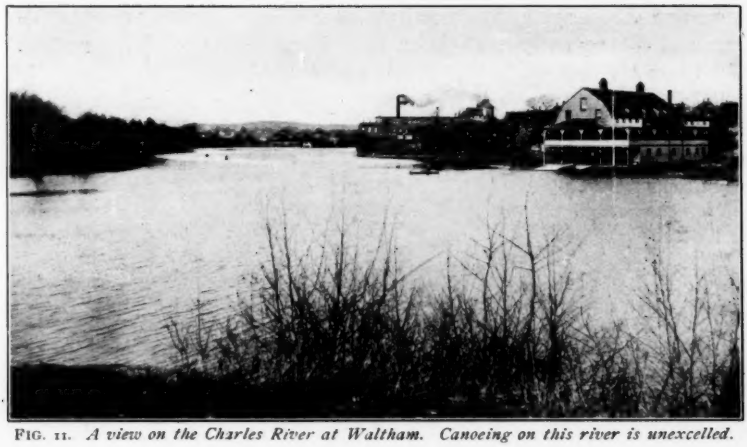


FIG. 11. *A view on the Charles River at Waltham. Canoeing on this river is unexcelled.*

XUM

Neck, Manchester-by-the-Sea, Magnolia, East Gloucester, and Ipswich in Massachusetts, Portsmouth and Newcastle in New Hampshire, and the whole Maine coast from York to Eastport.

If inland scenes are preferred, then the Newtons, Wellesley, Princeton, the Berkshire Hills in western Massachusetts, the White Mountain region in New Hampshire, the Green Mountains in Vermont, or the Adirondacks in eastern New York offer every variety of scene and opportunity for rest and recuperation.

THE BOSTON PARK SYSTEM

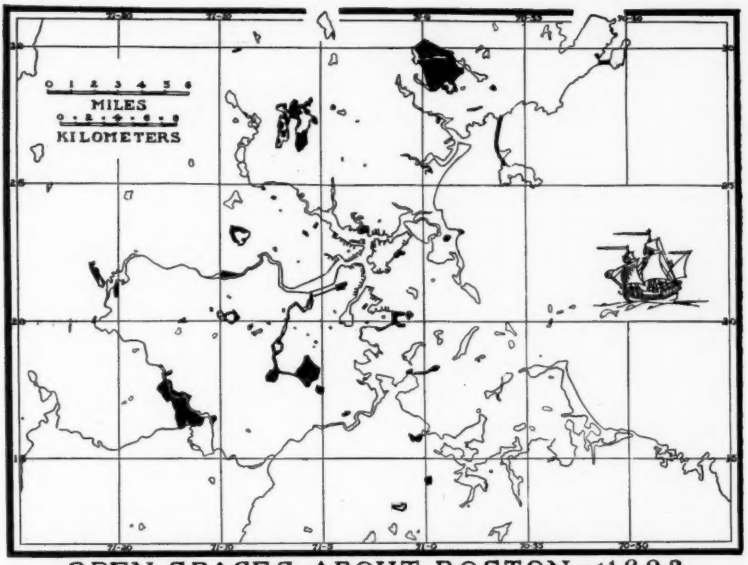
BY ARTHUR A. SHURTLEFF

THE parks of Boston and the great reservations of the Metropolitan District embracing the city and its environs constitute one of the largest and most carefully planned systems of public recreation areas which have been provided for any municipality of the world. While the casual traveler is attracted to these public domains mainly to enjoy their landscapes, the student of municipal affairs or of geography may well seek them to gain in addition to this pleasure an acquaintance with the great scheme which determined the distribution and design of the parks as an organic whole. This scheme is not to be credited alone to man's creation but to the topography of the district, which has brought about through its singularly symmetrical arrangement of rivers and hills, a more or less orderly and symmetrical distribution of highways and buildings and consequently of available open spaces for recreative purposes.

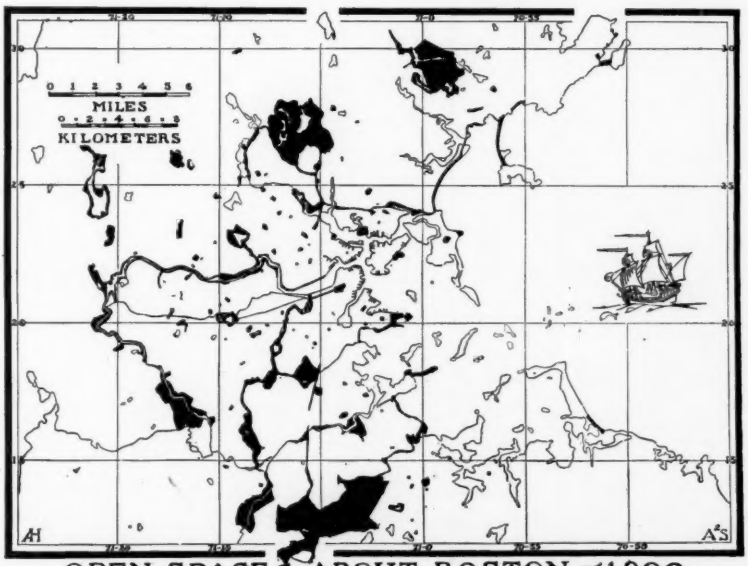
Since the development of this partly natural and partly man-made scheme had a vital effect upon the history of Boston parks and the characteristics of their design, it deserves to be brought to the attention of students, even at the expense of an elaborate description of the scenery of the parks.

THE SETTLEMENT AND EARLY GROWTH OF BOSTON

In 1630 Boston was permanently settled by colonists from England. At that time the face of the country was shrouded by a great forest, unbroken except for occasional meadows and ponds or clearings made by fire and the hands of natives. Men were outnumbered by the wild creatures of the woods, and houses and ships counted as nothing. The water of ponds and rivers was clear, and the forest floor was untrampled. But the forest offered an obstacle to the cultivation



OPEN SPACES ABOUT BOSTON—1893



OPEN SPACES ABOUT BOSTON—1900

FIG. 1.

of the ground and the extension of the settlement, and its presence awakened no thoughts of admiration in the breasts of the frontiersmen, but rather filled them with fear and foreboding. It was therefore without reluctance that the colonists made inroads upon it for the advantage of their fields and the extension of highways, as well as for the timber that it afforded for house and ship building. Since all the waters of the new country were pure, the colonists thought little of defiling the streams and ponds at their doors.

Settlement, which was at first confined to the seashore by the chance of the ships that brought the colonists to its borders, soon began to cut its way inland along the rivers, and it threw off detached villages into the forest to shift for themselves. Settlement followed the valleys, because their streams offered an easy course for transportation and a ready store of fishes and water for food and drink. Moreover, the river intervales offered excellent soil for farming, and the higher ground near the bases of the hills afforded dry and sheltered house sites and convenient situations for cheap roads. The hills, on the contrary, offered no inducements to the trader or the husbandman, and were left untouched until a demand for the timber upon their slopes called them into the economic scheme. The hills and the uncontrollable rivers were elements which defined the lines of settlement. Thus it happened that, while the colonists developed the country without plan and without forethought, the topography of the country forced upon them unconsciously a method of occupation and expansion which amounted to a plan. The forest mantle was rent again and again, while the open rivers and the houses and ships, with farms and wharves, became dominant features in the landscape of the seaboard and the inland country. It was at the mouths of the rivers, where the traffic of the valley roads and the waterways met the trade and traffic of the sea, that most rapid settlement took place. So precious became land in this district that hills offered slight obstacles to the house and road builder, and shallow marshes and pools were filled to extend the firm ground. Less favored districts along the coast, which could offer neither harbors, commerce nor land available for farms, remained in their native unoccupied condition.

The most favored point of trade, thriving upon manufactures and farming within reach of transportation, roads and water, was the town of Boston. This town of the original settlement possessed an advantage over the new towns about it, in virtue of its topographical position, which it never relinquished. It was upon the hills of Boston that fields

and woodland first gave way absolutely to a mantle of houses. To the credit of the early settlers, certain open spaces were reserved as gardens, and a public Common of considerable extent was by general accord barred against occupation by buildings. The practical value of this Common as a pasture for cattle and a training ground for militia doubtless formed the basis of regard for it, although in years to come it was to serve as the nucleus of a park system which was to attempt to undo the work of congestion which the young city was even then actively advancing. Thus the city of Boston grew for two hundred years.

In order to make clear the relation of this growth to the physical features of the district, it will be necessary to study a contour map* of the region. Such a map will indicate the opportunities which favored certain regions for rapid settlement, and which retarded the development of others. It will also show to what degree the symmetrical coast line, the symmetrically placed rivers, and the embracing horseshoe of hills were responsible for the symmetrical distribution of vacant lands and consequently for the distribution of parks and parkways which in the course of time, by deliberate intention, were founded upon these unoccupied tracts. (See Fig. 1.)

POPULATION

In 1790 only three per cent of the inhabitants of the state of Massachusetts dwelt in cities. The bulk of population was distributed in towns and villages and in detached farms. In 1870 twenty per cent of the state population was confined to cities. At this time there was an evident movement of the country population toward the cities, which was attributable to the decline of agricultural pursuits in the state, and a growing inclination among the people to escape from the monotony and discomfort of life in country towns. Besides this source of increase in the population of cities, there was a great influx from immigration, as well as the natural increment by birth. The population within six miles of the city of Boston doubled every eighteen years between 1820 and 1870. The number of inhabitants of the city in 1820 was 40,000; in 1860 it was 177,000; and in 1870 it increased to 250,000. At this time the death-rate in the congested parts of the city was as high as 379 in 10,000, while in the better parts it was as low as 57. The average death-rate for the state was 176. It was in the oldest portions of Boston, where streets were narrow and manufactories and stores were

*Such maps may be found in the Metropolitan Park Reports, or may be bought of the Geological Survey at the Boston State House.

crowding upon the dwellings of a poor population, that the highest mortality existed; while in the newer and wealthier parts of the city, where streets were wide, there was a low death-rate.

THE MOVEMENT FOR CITY PARKS

The movement for parks in the city of Boston is interesting for the tirelessness of its appeal, and the high success that eventually crowned it. The period of ten years between the first enactment and the passage of the act which authorized the construction of the first great park, represents an era of popular education in park location, design and maintenance, from which the community gained confidence in its ability to build and control parks which would serve the practical ends that were sought from them. An account of this interesting period cannot be included within the limits of this article, and the reader must refer to the Boston Park Reports for it. Suffice it to say that at the close of the ten years' struggle an order was finally passed authorizing a park in the Back Bay district. This action was approved by the mayor, and one hundred acres of land were bought. The acquisition of this territory represents an important era in the history of the Boston Parks, because it led ultimately to the formation of an extensive park system springing from this original tract. Early in 1879 the Park Commissioners held an open competition, to secure a plan for the proposed Back Bay Park. Although a prize was awarded, none of the plans were

FIG. 2. *A portion of Charlesbank playground, showing children going through open-air gymnastics, under a director paid by the city government.*

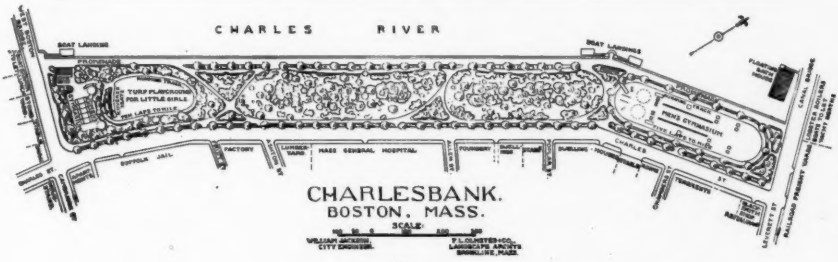


FIG. 3.

executed, and Mr. Frederick Law Olmsted was asked to prepare a plan in their stead. His plan was accepted and executed.

From that time until the present the parks of Boston have grown steadily, until they now comprise two thousand three hundred and fifty-four acres. In this way the people of Boston made a provision for their own welfare and the welfare of their children, which had been overlooked and neglected by the earlier builders of the city. It remains to be described how at a later period, the people of the district around Boston also provided parks to compensate them, as far as might be, for the open countryside which was being lost forever under a mantle of houses and streets.

THE PARKS OF THE CITY OF BOSTON

Within the limits of the present article reference can be made only to two of the most characteristic city parks.

The Charlesbank.—This playground of ten acres, upon the Charles river border of the city, was provided near one of the poorest and most densely settled districts by the demolition of a large number of old wooden buildings and the reclamation of a tract of river-bottom land. The plan and photograph will make plain the general features of the playground, including the disposition of the two gymnasia, and their accompanying running-tracks and buildings. Between the areas devoted to gymnastic exercises there is a considerable area of greensward bearing trees and shrubbery about its borders which are arranged to screen the houses and traffic of the streets near at hand from the water-side promenade, as well as to form an agreeable element in the playground. Boating facilities are provided along the water front, and in the winter season the men's running-track is flooded for skating. The city provides free instruction in gymnastics at both the men's and women's gymnasia, as well as free shower baths and lockers. Yearly over 70,000 women and girls and nearly 200,000 men and boys make use

of the gymnastic facilities which are afforded. The total cost of this playground for land and improvements to date is about $400,000, and the yearly cost of maintenance $10,000. No betterments were assessed upon neighboring property. (See Figs. 2 and 3.)

Franklin Park.—This park, of five hundred and twenty-seven acres, lies nearly five miles south of the heart of the city, with which it is connected by the chain of parks and parkways already mentioned. At such a distance from the political center of the municipality it is still within the limits of the outer settled district, where it is enjoyed by thousands of the community. The main interest of the park centers in a broad rolling tract of grass land, which occupies its heart, and which is supported on all sides by woodland upon plain and hill. This woodland screen hides the traffic and the buildings of the district outside the park, and protects the pastoral passages of the landscape against noise and distracting objects. Within the bays of the bordering woodland are provided lawns for tennis and other games, as well as playfields—one of them of great size—for the enjoyment of rural sports. Hidden within the woodland are areas set apart for swings, tilts and other devices for affording pleasure not sufficiently in keeping with the pastoral landscape to allow their intrusion upon it. At certain points, where the bordering mantle of trees is led toward the open park interior, there are provided shelters, overlooks and refectories, where visitors may enjoy extensive views. The drives and walks, which are arranged to bring the public to the most favored parts of the park without intruding upon it, are thronged upon holidays and afternoons, and the central areas of greensward as well as its bounding groves are enjoyed by hosts of people. In its informal and naturalistic features this park is typical of the greater portion of the Boston park system. Franklin Park has cost for land and construction, to the present time, nearly $4,000,000, while the cost of maintenance for the year 1899 amounted to $36,700. The increase in valuation of lands in the vicinity of the park, which were assessed for betterment, was $1,230,000 between 1883 and 1890. Of this increase at least ten per cent may be attributed to the presence of the park.

Franklin Park was designed by Frederick Law Olmsted, who prepared plans for the greater part of the Boston park system.

CONDITIONS DEMANDING METROPOLITAN PARKS IN 1892

During the period between 1869 and 1892, while the city of Boston was securing a park system for itself by argument, legislative act and

FIG. 5. *The Wolcott pines on the Blue Hills Reservation.*

thirty-seven cities and towns which were enumerated as constituting the Metropolitan Park District of Boston. The Board of Metropolitan Park Commissioners continues to exercise its powers for the taking and improvement of lands for the Metropolitan District.

THE METROPOLITAN PARKS AS A WHOLE

It is made evident, by the plan of the Boston Metropolitan district and its reservations, (See Fig. 1.) that ample open spaces have been provided for the people upon the high bordering hills, upon the banks of

FIG. 7. *A stretch of the beautiful driveway in a portion of the Fellsway leading to the Middlesex Fells Reservation. Pine Hill is in the distance.*

the traversing rivers and upon the ocean shores which bound it. The plan also shows the parkways (See Fig. 7.) which tie the various reservations to one another and bring them within reach of the people of the cities. The uniform distribution of open spaces around and within the district, and the effective parkway connections between them and the heart of population, characterize the Boston Metropolitan Parks as a system, well balanced, and well knit to the great metropolis of which it has become an organic part. The lands thus secured to the public amount to about ten thousand acres and include in addition over twenty miles of connecting parkways. The cost of the system, to date, for land and improvements, is over $5,000,000.

THE RESERVATIONS

It has been the policy of the commissioners to develop acquired lands to no greater extent than to improve existing roads, to establish fire patrols, to maintain superintendents, police forces, and sufficient numbers of laborers to mend roads and to attend to minor forest improvements. In the case of the Revere Beach Reservation, however, the commission has undertaken the execution of completed works from carefully prepared plans. In order to set forth the policy of the commissioners in these matters, and to describe the chief characteristics of two of the reservations, it will be profitable to refer briefly to the Revere Beach and Middlesex Fells reservations. As for the other open spaces, no further reference can now be made to them.

The Revere Beach Reservation.—Revere Beach, previous to its acquisition by the Board, was occupied by an objectionable class of hotels, dance halls and shops, and patronized by a rough element. Upon securing this tract of shore for the public, the commission removed all buildings from the front slope of the beach, and coöperated with the railroad, which occupied its crest, to find a new location behind the remaining houses. Upon the original site of the railroad a driveway with bordering promenades was provided extending for a distance of over two miles along the crest of the beach. The commission also erected an administration building, in conjunction with two extensive bath-houses for surf-bathing. In connection with these buildings, a laundry, a bicycle-storage shed and a police station were installed. Dressing-rooms to the number of seventeen hundred were provided, and over seven thousand men and women have used them in one day. A small charge is made for the dressing-rooms and for the use of bathing suits and towels. The receipts from this source in 1899 covered the cost of the years' maintenance, which amounted to $20,000. The natural resources of the reservation, in a shore offering unexcelled opportunities for bathing and an inspiring view of the open sea, when combined with the provisions for enjoyment afforded by the bath-house and the various shelters, have made this acquisition of the commission the most popular of all the public holdings. Over one hundred thousand persons have enjoyed the privileges of this reservation in a single day. The cost of the reservation for land and construction, to date, is over a million and a half dollars.

The Middlesex Fells Reservation.—This tract of forest, containing two thousand acres of land, exclusive of the extensive holdings of the Metropolitan Water Board, lies upon the escarpment of the northern

range of hills which bound the Boston Basin. It is surrounded by the towns of Stoneham, Woburn, Winchester, Medford, Malden and Melrose. Its steep hills kept at bay the advance of the housebuilder until just before its acquisition by the commission. This reservation, like all the other holdings of the Board, with the exception of the Revere Beach Reservation, has been kept in its natural state, as far as extensive improvements of roads or the installation of shelters and other conveniences for the public are concerned. As regards the forest trees in the various Metropolitan parks, their variety and distribution is essentially the same in the Fells as in the other reservations. The summits of the rocky hills support a stunted growth of pine, cedar, birch, scrub-oak, juniper, barberry and other plants enduring poor soil and great exposure. The hill slopes are usually clad in a coppice of oak and hickory, with here and there a colony of chestnut, (See Fig. 6.) pine or poplar. These trees are survivors from the ancient wood lots of the community, whose ownership of the land preceded the commissioners' takings. Trees upon the lower land are often of large size, and frequently include elms which indicate the sites of old farms, in whose immediate neighborhood trees suffered less severe treatment than upon the hills. The great oaks in the Beaver Brook Reservation are examples of trees preserved by ancient land holders for the mere love of them near home grounds. The Middlesex Fells Reservation possesses a treasure in its pond scenery which is not to be matched in any of the other reservations, and which goes far to make amends for the small size of the hills as compared with the semi-mountainous heights of the Blue Hills Reservation. (See Figs. 4, [frontispiece,] 5, and 6.) The cost of the Middlesex Fells Reservation for land and maintenance to date is a little less than $900,000.

Metropolitan Boston profits to-day by the plan of settlement which the topography of the district has relentlessly forced upon it since the first frontiersman built his cabin in 1630. Sterile and harborless ocean shores, unstable and unhealthy river and brook banks and insurmountable hills, have been blamed and fought generation after generation because they could not be adapted to the requirements of trade and house building. But to-day, when traffic and the walls of buildings threaten the life of the community, the plan of nature has become a resource. It is upon the ground forbidden to the trader and the builder that enough of forest, meadow, sunlight and water have been found to save from extinction and to preserve for present necessity something of the beauty and life-giving qualities of the original forest mantle, the original meadows and early pastures, the pure waters and the untroubled horizons of the first civilization.

BOSTON: A CENTER OF INDUSTRY

BY PHILIP EMERSON
Of the Cobbet School, Lynn, Mass.

BOSTON is rightly known as "The Hub," since it has long been the center for New England life. There is hardly another important section of the country so clearly defined in its physiography, history and industries as is the New England plateau. Naturally, therefore, no other large city of our country is so clearly the embodiment of the life of a section as is Boston. It suggests cities of the Old World. It is like London in Metropolitan England, but is more truly the industrial center of eastern New England than London is of Old England, for the great ports of Glasgow and Liverpool serve industrial Britain.

The sources of Boston's preëminence as a New England metropolis, a center for thought and influence as well as for commercial convenience, are naturally historic as well as physiographic. The city is situated on the harbor at the head of the drowned portion of the Boston Basin, as Providence is at the inner harbor of the drowned Narragansett Basin and New Haven on the Connecticut Valley Lowland. Of these three lowlands of weak rocks on the border of the hard rocks of the New England upland, the Boston Basin alone looks toward Europe. It was naturally the center for the great Puritan immigration. Although settled a little earlier than Boston, neither Plymouth nor Salem harbor, just outside the lowland basin, one to the north and the other to the south, was so centrally located for movement inland.

From Boston, as religious differences arose, colonies struck out, to settle the other attractive lowlands, and to spread in time over the rugged upland. The largest group of people was maintained at Boston, however, although before railroads came, and while ships were small, Salem and other rival harbors held goodly shares of New England commerce. So long as life was primitive, and before frontier development had passed beyond New England, Boston's advantages of position were not very potent. A strip of farming settlements near the coast, with only rude cart roads for their occasional traffic, was best served by many ports. Fish and pine timber were equally convenient to every one of these ports. When ships of deeper draught were built, shallow harbors were deserted, and Boston was one of several that gained advantage. When New England became a region of factory cities connected by railroads with the sea, Boston gained importance at the

expense of all its rivals, because of the central position of its fine harbor, pushed farther inland than any other north of Cape Cod.

The Embargo and the War of 1812 checked commerce. Boston merchants no longer profited by importing foreign manufactures. Their ships were moored at home or in danger of capture at sea. Their Yankee energy forbade their remaining idle themselves or allowing their capital to remain unutilized. Merchants turned to manufacturing. The Boston Manufacturing Company built a dam on the Charles river at Waltham, on the border of the Boston Basin, erected a cotton mill, and placed in it a power loom they had devised. Success was so marked that Mr. Lowell and other Boston capitalists constructed a large and costly dam on the Merrimac river where it turns toward the sea, and erected the cotton mills about which gathered the new city of Lowell. Other massive dams and thriving mill cities followed, such as Manchester, N. H., Lewiston, Maine, and Holyoke, Mass. A canal was built from Boston to Lowell, and ambitious canal schemes were planned; but the day of the railroad was at hand, and to-day only occasional ruined portions of the Old Middlesex Canal may be seen as railroad or trolley bears one to Lowell. (See Fig. 1.)

In summary, we may say Boston was first the center for populating New England; it was the largest of many important colonial seaports; it supplied the capital and leadership for establishing large interior factroy cities at convenient water powers; it was the natural center for railroads and largely shared in building them. As a result this city became the best port for importing the raw materials of manufacture, the natural center for the head offices and sales agents of New England corporations, the port for exporting goods to other lands and shores.

A contributing influence to these ends is the fact that Boston is a port for more than New England. A direct line toward Europe along the Great Lakes and the Mohawk Valley reaches the sea at Boston, not New York. When the railroad became able to compete successfully with the Erie Canal, and after the Hoosac Tunnel had been built by Massachusetts, grain, cattle, and other western products came in quantities to Boston for export. The very early development of textile manufacturing in New England, and New England's preëminence in shoe manufacturing, gave Boston the lead as a mart for wool and leather, which it still maintains in our country. This trade in exports and imports for a large section of the country, combined with the local business of New England, has made it profitable for several European steamship lines to maintain frequent and regular sailings from Boston

to Liverpool. This has given Boston an advantage shared by no other New England port.

The visitor to Boston, then, has the opportunity to study the industries of New England, since they all center here. Boston was once merely the settlement on the hills around the harbor. To-day it is really the entire lowland of the Boston Basin. Charlestown, Dorchester and other towns are united under the city government. Brookline, the most populous town in the country, Cambridge, and more than a dozen other cities and towns are continuous with Boston and

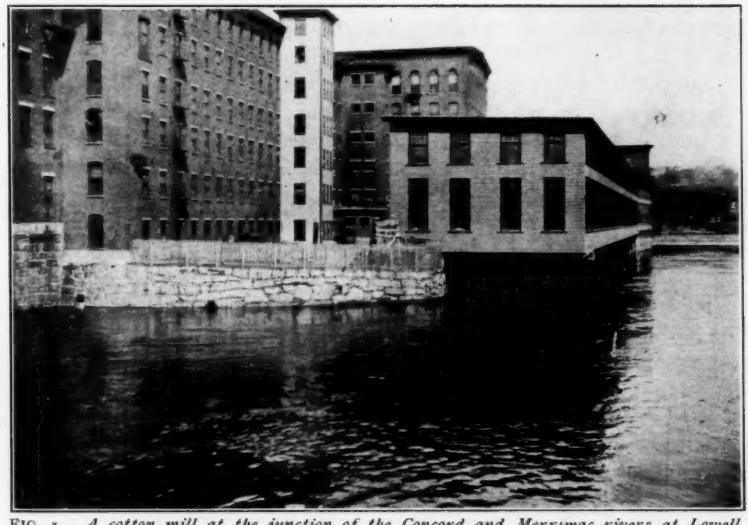


FIG. 1. *A cotton mill at the junction of the Concord and Merrimac rivers at Lowell. Lowell is one of the chief manufacturing cities of New England.*

form parts of the Metropolitan district. It should be measured as a population center of a million people, ranking with Philadelphia and Chicago. Half the people of Massachusetts, a fourth of all New England, are gathered in the Boston Basin. Moreover, the near-by district of manufacturing cities and towns of Rhode Island and eastern Massachusetts, lying between the interior upland and the sands toward Cape Cod, is the most densely populated section of the new world, and suggests the conditions of industrial England and of Belgium.

As a large city and commercial center, Boston has many industrial plants where food is prepared for sale. In Charlestown and Cambridge are large pork-packing establishments, supplying New England trade.

XUM

Brighton, a section of Boston, still maintains a remnant of its fame as a cattle market. Whittier sings of the herders who gathered cattle from New England farms for the Brighton market. To-day it is cheaper to transport dressed beef than live steers, and western cattle that come to Boston alive are for shipment to Europe. Even this traffic has been stopped the past winter, and until the foot and mouth disease is certainly stamped out of New England.

In Cambridgeport is a great cracker bakery. In Dorchester is the home of Baker's Chocolate. There is a sugar refinery in South Boston, and there are factories in Boston that turn the sugar and chocolate into candy. Mills for roasting coffee, mills for grinding spice, factories for curing fish, and other like establishments are here; and usually visitors may secure entrance.

As the port and railroad center of an industrial section, Boston is the seat of a large wholesale trade. It is excelled by London alone as a wool market. Near the Southern Terminal Station are the offices of dozens of wool merchants, and near by on the water front are storehouses where wools from all the world may be examined, and just the quality of wool desired by a manufacturer in Philadelphia or elsewhere may be secured. To go from floor to floor of a warehouse with a wool merchant, studying the wools received from the several states and from all parts of the world, such as the fine merino wools of Australia, and the coarse carpet wools of Turkey, and seeking the connection between the quality of every sort of wool and the climate or civilization of its homeland, would be to review one's geography by the laboratory method, and to good purpose. Then one would be tempted to take an hour's ride by train to Providence or Lawrence, there to spend several hours in one of the newly equipped mills watching the many machines clean and comb the fiber, spin and weave the yarns, until the finished worsteds and woolens in most varied cloths are produced. Then back to the mill offices in Boston, and the great wholesale stores where merchants and tailors make their purchases. Thence on to the workshops of manufacturers of ready-made clothing, where suits are fashioned for the retail counter. Thus in and out of Boston repeatedly passes the material on its way from the backs of sheep to those of people. Even then it returns: Boston is a center for collecting old materials, as the visitor will easily believe when he peers into some shop on the wharves which is crowded with the waste spoil of ships. To Boston come woolen rags. These go out again to shoddy mills where the fiber is torn apart and cleaned. Mingled with good wool

it is again spun and woven, and so prepared it once more finds sale by way of "The Hub."

The relation of Boston to the New England woolen industry is a type of its relations to other industries. Here are the offices of many cotton brokers, though they need no warehouses, since cotton can be closely graded and sold by grade or sample. In Boston, too, are the offices of cotton mills, and wholesale and retail dealers in cotton cloth and the articles manufactured from it. Boston is a great market for hides from all the country and the world. In Woburn, Peabody, Salem, and Lynn, near the northern rim of the Boston Basin, are extensive tanneries, for although tanning by bark is best carried on where forests remain, modern tanning by chemicals can well be maintained near Boston. At this port and railroad center hides and chemicals can be cheaply gathered, and the shoe factories that use much of the leather are located in a ring of many shoe cities and towns just outside the Boston Basin, from Lynn and Haverhill through Marlboro to Brockton.

Shoe making was early established in New England, the industry being a by-employment of the farmers to supplement the small returns of their farms. Near Boston it developed into a great factory industry, about the time of the Civil War. The ring of industrial communities farther from Boston, including places like Lowell, Worcester, Providence, and Fall River, adopted textile manufactures in preference to shoe making, since they possessed water power for driving mill wheels, while during the decades when this choice of industries was made shoes were made by hand and not by power.

In Boston there are agencies for selling merchant iron and steel for use in New England manufactories; agencies, also, for selling the manufactures of steel and other metals from the many New England machine shops—wonderful machinery for textile mills and for use in making other machines, tools from Providence and Worcester, watches from Waltham, jewelry from Providence and Attleboro. Heavy metallic goods are made near the sources of ore and power, no longer in New England. Fine metallic goods, in which labor counts for most of the cost, are still characteristic of the territory close to Boston, for here are the sources of skill and effective workmanship in the educational opportunities afforded by Massachusetts and her sister states.

How may visitors study the industrial life centering in Boston? Probably most visiting teachers will prefer to visit the beaches and parks, or the historic scenes of Plymouth and Concord, when not in attendance on the sessions of the National Educational Association.

XUM

FIG. 2. *A view in the Fore River Ship & Engine Company's big plant. The power house and machine shop are on the left. New buildings are continually being added to accommodate their growing business. The new battleship "Vermont" is being constructed here.*

Special excursions are planned on these lines. However, some teachers will wish to visit the great factories of New England, and the wharves of Boston, and if any such will write to Mr. G. H. Martin, Supervisor in the Boston schools, Chairman of the Committee on Excursions, arrangements will be made so that such trips may be conveniently taken. Industries characteristic of New England should be chosen. In Waltham the cotton mills of the Boston Manufacturing Company and the Waltham Watch Company factory are near each other, and could be hastily seen in a half day. Or the carpet mill at Roxbury and the Pettee Machine Works at Newton could be seen in succession. The makers of women's shoes at Lynn and of men's shoes at Brockton would welcome the opportunity to further advertise their products by showing their manufacture, although "Sorosis," "Regal," and the like have a familiar sound the land over. The great plants close to the port of Boston where foods are prepared, as already related, suggest another feasible excursion or series of trips. A short trip by steamer along the picturesque North Shore takes one to Gloucester where the fishing industry in all branches is best seen.

There are many opportunities in Boston to study the great industry of publishing books and periodicals. Trucks unload great rolls of paper from the pulp mills of Maine, and the visitor may follow these to the press rooms in the basements of "Newspaper Row," the part of Washington street just north of the Old South Church. The Youth's Companion building may be visited, not far from the convention hall, and a guide will conduct visitors through all departments and relate the story of the publication of this famous family weekly. The school book publishers all keep open house. Ginn and Company have offices next the State House in the historical Hancock mansion, No. 29 Beacon street, their Athenaeum Press is within easy reach by trolley, and they will be delighted to conduct teachers through any of their establishments. Houghton, Mifflin and Company with offices on Park street, facing the Common, and their Riverside Press in Cambridge, near the homes of the poets whose works they publish, will be likewise hospitable. The list of similar possibilities is long.

All should take a walk along the wharves since they are near at

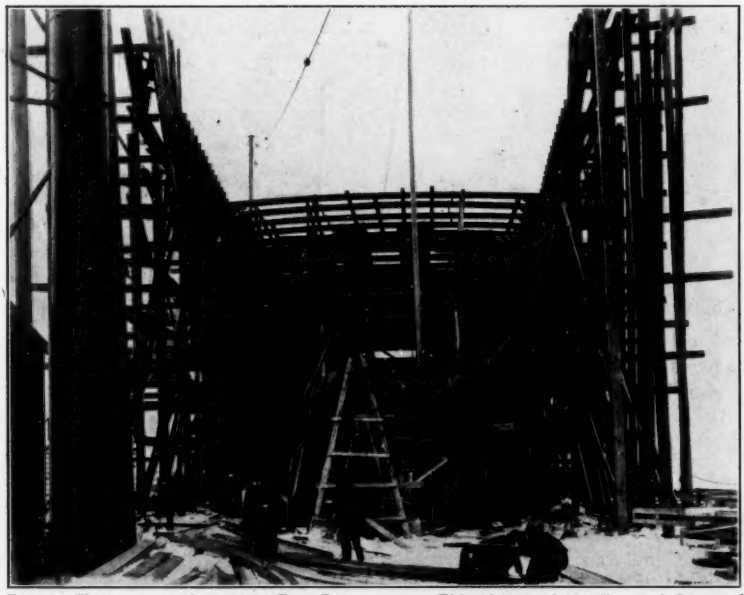


FIG. 3. *Ship construction at the Fore River works. This picture shows the steel frame of the seven-masted schooner "Henry L. Lawson," recently built. Warships are also constructed here. Ships are built at Boston, yachts and small craft at East Boston.*

hand and because the trip will give characteristic views of Boston in many phases of its life. Starting from the Common one traverses the retail or shopping section, then beyond Washington street one comes to wholesale establishments, the different lines being grouped on adjoining streets, here shoes and leather, there dry goods and so on. Passing the Old South Church and the Old State House, one comes to Faneuil Hall and the long Quincy Market, adjacent to which are the offices and stores of commission merchants in all kinds of farm produce and foods. This wholesale district extends to the warehouses on Atlantic avenue and the wharves of the harbor front. Alongside these wharves are coasting steamers from many ports of our own Atlantic coast, from the Provinces, and from the West Indies. The freight sheds upon the wharves may be freely traversed, and a great variety of exports and imports will be seen. For instance, one may chance to see a banana steamer from Jamaica. Some fruit is being unloaded to the wharf, and some by means of a lighter into freight cars that are ranged alongside the steamer. Some bunches will be dead ripe, and fruit from these is often distributed to interested parties of observers. From the southern states come bales of cotton, southern pine lumber, ship stores, sisal hemp from Yucatan, and other staple products that geography catalogues. Waste portions of fiber, minerals, and the like may be secured often for the school cabinet. The exports of Boston will be seen piled in a section of each shed, apart from the imports, and they will illustrate the variety of the products of New England—fish, furniture, shoes, heavy machinery, patent medicines, and a long list of unrelated goods.

Reaching T Wharf the fishing schooners appear. First the dories of Italian fishermen, who secure flounders a few miles down the harbor; then small schooners that fish for cod in Massachusetts Bay. Other crafts are preparing for or returning from longer voyages. Here a crew are baiting their trawls in preparation for setting sail; there a schooner has just come in and her skipper is selling his fish to the dealers whose stores are ranged along the wharf, or the fish are being delivered from the vessel's hold. Before leaving the wharf one should visit the exhibit that was sent to the Centennial Exhibition, and which is now stored in a little room back of a dealer's office. It finely illustrates the industry by means of specimens, models and photographs.

A few minutes on a ferry boat takes one across the inner harbor to East Boston, where are the wharves of European liners. Here are seen other classes of imports, European goods, also products transshipped

at Liverpool from South American steamers. There is a grain elevator at the Leyland wharves, and this may be entered to see how wheat and corn are unloaded from the cars, carried to the upper stories, weighed, dropped into the deep storage bins, and finally delivered thence by automatic appliances to the holds of steamers. Near Quincy is located the large ship building plant of the Fore River Ship and Engine Co. (See Figs. 2 and 3.)

Northward is the Navy Yard on the Charlestown shore, just below Bunker Hill, with the old "Constitution" and modern warships moored near by. This is well worth a separate trip. Beyond, on the Chelsea shore, are the wharves of other foreign steamers, and another great grain elevator.

The return from the harbor may be through the North End, whose narrow streets are crowded both by historic associations and by recent immigrants and their children. From the public pier and playground at the water front one climbs to the old graves of Copp's Hill burying ground, passes the Old North Church, where the signal lanterns were displayed to warn Paul Revere, thence back into the business streets.

A visitor to Boston during the convention week will see but a few phases of its commercial or industrial life. These should be viewed thoughtfully so that they may appear in right relations to the large industrial life centering here, and as typical of other industries here and elsewhere. Teachers even more than pupils need to study geography at first hand, that a sufficient basis may be formed for the full appreciation of geographic text. Otherwise they cannot so vividly picture many facts in their own thought and to their pupils as to awaken enthusiastic interest and clear comprehension.

THE GEOGRAPHICAL DEVELOPMENT OF BOSTON

BY F. P. GULLIVER, PH.D.
Of St. Mark's School, Southboro, Mass.

THE crooked streets of Boston are said to follow the old paths along which the early settlers of the place drove their cows to and from their pasture on the common. However true this may be, it is certain that many of the main streets of the old city proper mark geographic features, formerly of importance, but now almost entirely forgotten. Atlantic avenue follows closely the original

shore line. Washington street preserves in its curves the old road along the narrow neck of land, which was the only connection for a long time between the mainland and Boston peninsula with its three hills which gave the name Tremont. Causeway street represents the dam to the earliest tidal mill pond, and Beacon street, the "Mill-dam," was built later to hold back the waters of Back Bay at high tide to be used for power at low tide. The curve of Park Square gives the shoreline of this Back Bay, where the fathers and grandfathers of the present generation used to put on their skates to glide over the area now occupied by Trinity Church and the Public Library.

In a very marked degree Greater Boston shows its physiographic control in its development. The hills, valleys, islands, marshes, estuaries, etc., have helped or hindered the settlement and growth of the many village sites which are now included in Metropolitan Boston. Many locations were made before 1650 around Boston bay, (See Map 1.) so that there were a large number of towns around the central "hub" at the foot of the three mountains which were later to be taken in to form the spokes of the wheel of greater Boston. Some portions of this area are still under distinct political governments, as Cambridge, Brookline, and Newton, but they no less truly form a part geographically of Metropolitan Boston.

The limits of the area of Greater Boston are variously drawn for different purposes. In order to show how the villages have grown together in the past and how they will continue to grow together in the future to form continuously inhabited areas, the ten mile limit from the State House has been adopted for this article; thus the following cities and towns are included: Arlington, Belmont, Boston, Braintree, Brookline, Cambridge, Chelsea, Dedham, Everett, Hyde Park, Lexington, Lynn, Malden, Medford, Melrose, Milton, Nahant, Needham, Newton, Quincy, Revere, Saugus, Somerville, Stoneham, Wakefield, Waltham, Watertown, Winchester, Winthrop, Woburn. (See map 5.) Portions of some of these towns are very thinly settled, but they all show growth from the centers toward their neighbors, along railroads or highways, so that the attempt to join is clearly seen. In the above list under Boston are included the following centers which had an independent beginning: Brighton, Charlestown, Dorchester, East Boston, Jamaica Plain, Roxbury, South Boston. In addition it must be remembered that many of the above towns began to grow in several places, and are therefore made up of several village sites. For example Newton includes the following centers of growth; Newton, Newton

Center, Newtonville, West Newton, Newton Highlands, Newton Upper Falls, Newton Lower Falls, Auburndale, and Waban.

It will readily be seen that one must have intimate knowledge of a large number of centers of growth of such an area as Greater Boston, in order to give with any degree of accuracy the real growth for periods of fifty years. The writer consequently presents with much hesitancy the results of his study of this region, knowing that on account of his incomplete knowledge of certain areas, many errors and inaccuracies have been included. Still the general impressions of growth

Scale: 10 miles = 1¼ inches.

MAP 1. *Greater Boston, 1650.*

and development as given in this series of maps from 1650 to 1900 are undoubtedly correct, and one can see how the estuaries and marshes have kept areas apart until bridges, filled land, and now elevated roads and tunnels, have connected them. Greater Boston can become a unit only by more complete connection between the isolated portions.

If there is interest enough in this series of maps to make it worth while to prepare a more exact set of maps, showing the increase of population for each period of fifty years from 1650 to 1900, the writer would be very glad to put the data together if some one from each town would undertake to look up the data for that town and record the

MAP 2. *Greater Boston, 1700.*

same on a series of large scale town maps, for each period of fifty years. This can be done only by some one who has access to the town records and has the knowledge of local buildings. Such a set of maps would be of great interest to each town, and would be worth recording for future comparison, when many of these local units have been swallowed up in the extension of Boston.

There are a great many points of interest in the past, present, and future development of Boston, as shown on these maps, only a few of which can be mentioned here. Old Boston was at first very much isolated from the surrounding towns, the only connection by land being the neck on the southwest side, across which all wheeled vehicles had to pass along what is now Washington street. (See maps 1 and 2.) Thus Roxbury and Dorchester were the two centers most closely connected with Boston for some two hundred years, and through them had to pass the stage coaches and produce-laden wagons from the towns to the west and south. A wagon to go from Cambridge to Boston had to start westward, and then go southward, and finally eastward through Roxbury across the neck.

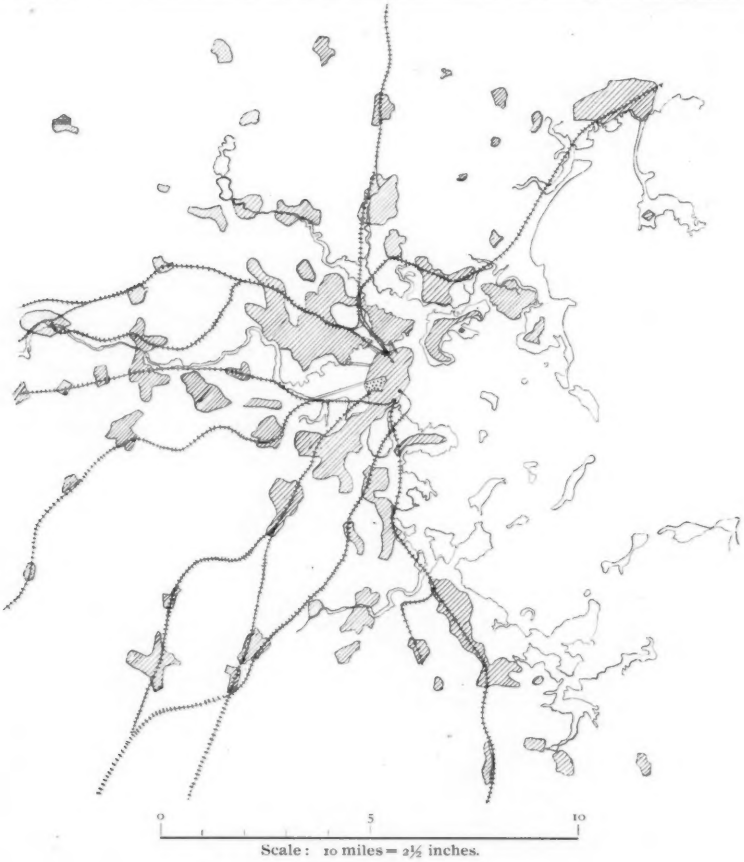
By 1800, however, two bridges had been built to connect Boston

with the towns to the west and north, one to Cambridge and the other to Charlestown. (See map .) At first, communications had to be around by the neck or else by boat across the Charles or Mystic estuaries. These bridges brought a great deal of business from the north to the city, and the centers of population, Cambridge, Somerville, and Charlestown increased much more rapidly. By 1850 a second bridge had been built to Cambridge and a second to Charlestown. (See map 4.)

The filling in of the Back Bay and the reclamation of the tidal flats along the Charles river has been one of the greatest improvements of the past seventy-five years. By 1850, the mill-dam and two lines of railroad had crossed Back Bay, and considerable filling had been done on both sides of the neck. (See map 4.) Now in place of the narrow neck is a broad land connection to the south and west, and the city is built almost continuously across this area to Dorchester, Roxbury, Jamaica Plain, and Brookline. (See map 5.) The tidal flats on the Cambridge side of the Charles have also been filled, and building has commenced upon them.

Scale: 10 miles = 1¾ inches.

MAP 3. *Greater Boston, 1800.*

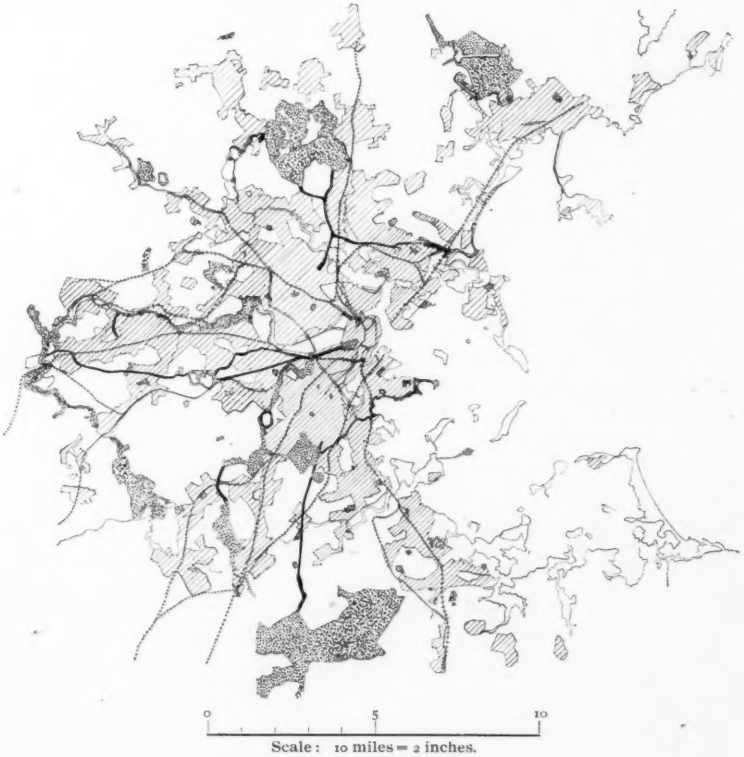


Scale: 10 miles = 2½ inches.

MAP 4. *Greater Boston, 1850.*

The growth and extension of the wharf lines along the Boston, Charlestown, East Boston, and South Boston shore lines shows increased facilities for commerce. The plans for improvement around South Boston include the making of a good deal of new land and the formation of a marine park. There are a great many other signs of recent development which will not be mentioned here. There are, however, two great systems of improvements to which reference should be made. One of these is the extensive park and boulevard connections, which

will tend to make of the many village sites seen on the earlier maps a well coördinated city. An article on this subject by Mr. Shurtleff appears in this number of the JOURNAL OF GEOGRAPHY. Another very important factor in the unifying of Greater Boston is the work of the Metropolitan Water and Sewerage Board. Many millions of dollars have been spent in recent years to secure a system of water supply of the highest quality and to supply adequate means for carrying off the waste water. The equalization of water conditions for all the former village sites of the Metropolitan area will do a great deal toward bringing the separate communities together into a Greater Boston.



MAP 5. *Greater Boston, 1900.*

GEOGRAPHICAL NOTES

Boston in 1810

Extracts from a description of Boston, appearing in the third edition of the American Gazetteer, compiled by Jedidiah Morse, D.D., and first printed in 1797.

BOSTON, a post town, and the capital of the state of Massachusetts, the largest town in New England, and the fourth in size and rank in the United States, lies in 42° 23′ 15″ N. lat. and 70° 52′ 42″ W. lon. This town, with the towns of Hingham, Chelsea and Hull, constitute the county of Suffolk; 176 miles S. W. of Wiscasset, 61 S. by W. of Portsmouth, 164 N. E. of New Haven, 252 N. E. of New York, 347 N. E. of Philadelphia, and 500 N. E. of the city of Washington. Boston is built upon a peninsula of irregular form, at the bottom of Massachusetts Bay, and is joined to the mainland by an isthmus on the S. end of the town leading to Roxbury. It is two miles long, but is of unequal breadth; the broadest part is 726 yards. The peninsula contains about 700 acres (other accounts say 1,000) on which are about 2,600 dwelling houses. The number of inhabitants in 1790 was 18,038, in 1800, 24,987, and are now, 1809, supposed to be nearly 30,000. The town is intersected by 97 streets, 36 lanes, and 26 alleys, besides 18 courts, etc., most of these are irregular, and not very convenient. State street, Common street, and a few others, are exceptions to this general character; the former is very spacious, and being on a line with Long Wharf, where strangers usually land, exhibits a flattering idea of the town. Here are 23 edifices for public worship, of which ten are for Congregationalists, three for Episcopalians, four for Baptists and two for Methodists; the Friends, Roman Catholics, Sandemanians and Universalists have one each. Most of these are ornamented with beautiful spires, with clocks and bells. The other public buildings are the old State House, now converted into offices, stores, etc. * * * Boston harbor is formed by Point Alderton on the S, and by Nahant Point on the N. The harbor is capacious enough for 500 vessels to ride at anchor in good depth of water; whilst the entrance is so narrow as scarcely to admit two ships abreast. It is variegated with about 40 islands, of which 15 only can be properly called so; the other being small rocks or banks of sand, slightly covered with verdure. These islands afford excellent pasturage, hay and grain, and are agreeable places of resort in summer to parties of pleasure. Fort Independence, on Castle Island, formerly Castle William, about

3 miles E. of Boston, is a very strong fortress, lately built by the government of the United States at a great expense, and defends Boston harbor. It is a regular, strong, enclosed work; the ramparts of stone and brick, with a magazine, quarters, barracks and other buildings; commenced in the year 1800, and were completed in 1803. These are in good repair. Expense D. 186,195.11. This fort is sufficiently manned for a peace establishment. The Light House stands on a small island on the N. entrance of the channel, (Point Alderton and Nantasket Heights being on the S.) and is about 65 feet high. To steer for it from Cape Cod, the course is W. N. W. when within one league of the Cape; from Cape Cod to the Light house is about 16 leagues; from Cape Ann the course is S. W., distant 10 leagues. A cannon is lodged and mounted at the Light House to answer signals. Only seven of the islands in the bay are within the jurisdiction of the town, and taxed with it, viz.: Noddle's, Hog, Long, Deer, Spectacle, Governor's, and Apple islands. The wharves and quays in Boston, are about 80 in number, and very convenient for vessels. Long Wharf, or Boston Pier, in particular, extends from the bottom of State street 1,743 feet into the harbor in a straight line. The breadth is 104 feet. At the end are 17 feet of water at ebb tide. Adjoining to this wharf on the N. is a convenient wharf called Minot's T, from the name of its former proprietor and its form. Vessels are supplied here with fresh water from a well surrounded by salt water, which has been dug at a great expense. Long Wharf is covered on the N. side with large and commodious stores, several of which are fire proof, and in every respect exceeds any thing of the kind in the United States. A company, incorporated for the purpose in 1796, have cut a canal, on the E. side of Boston neck, connecting the harbor of Boston, with Roxbury. The view of the town, as it is approached from the sea, is truly beautiful and picturesque. It lies in a circular and pleasingly irregular form round the harbor, and is ornamented with spires, above which the monument of Beacon Hill rises, which is now, however, overtopped by the new State House, on the base of the monument are inscriptions, commemorating some of the most remarkable events of the late war. Beacon Hill is the highest ground on the peninsula, and affords a delightful and extensive prospect. The common below it contains about 45 acres always open to refreshing breezes; on its east side is the Mall, a very pleasant walk above 500 yards in length, adorned with rows of trees, to which an addition of about 100 yards has been lately made. Charles River and West Boston bridges are highly useful and orna-

XUM

mental to Boston; both are on Charles River, which mingles its waters with those of Mystic River, in Boston harbor. Charles River bridge connects Boston with Charlestown in Middlesex county, and is 1,503 feet long, 42 feet broad, stands on 75 piers, and cost the subscribers 50,000 dollars. It was opened June 19, 1787. * * * In 1748, 500 vessels cleared out of this port for, and 430 were entered from, foreign parts. In 1784, the entries of foreign and coasting vessels were 372, and the clearances 460. In 1794, the entries from foreign ports were 567. In 1795, the entries amounted to 725, of which the ships were 96, barques 3, scows 9, polacre 1, brigs 185, dogger 1, schooners 362, shallop 1, and sloops 65; the number since has much increased. The aggregate tonnage for 1805, was 115,169 tons 02 95ths. The principal manufactures consist of rum, loaf sugar, beer, sailcloth, cordage, wool and cotton cards, playing cards, pot and pearl ashes, paper hangings, hats, plate glass, tobacco, and chocolate. There are thirty distilleries, two breweries, eight sugar houses, and eleven ropewalks. In the year 1789, the intercourse with the country barely required two stages and twelve horses, on the great road between this and New Haven. In 1797, there were twenty carriages and one hundred horses employed. The number of the different stages that run through the week from this town, was, at the above period, upwards of 20; eight years before there were only three. The number has since considerably increased. Attempts have been made to change the government of the town from its present form to that of a city; but this measure, not according with the democratic spirit of the people, has as yet failed. At an annual meeting in March, nine Selectmen are chosen for the government of the town; at the same time are chosen a Town Clerk, a Treasurer, 12 Overseers of the Poor, twenty-four Firewards, twelve Clerks of the Market, twelve Scavengers, twelve Constables, besides a number of other officers. If the inhabitants not do reap all the advantages they have a right to expect from their numberous officers, it is not for want of wholesome laws for the regulation of the weights, measures and quality of provisions or other branches of police, but, *because the laws are not put in execution*. Besides those called Trained Bands, there are four other military companies in Boston, viz.: the Ancient and Honorable Artillery Company, the Cadets, Fusiliers and Artillery. The Ancient and Honorable Artillery Company was incorporated in 1638, and the election of a captain and officers of it for the year is on the first Monday in June annually, which is observed here as a day of

festivity. Several officers in the American army, who signalized themselves in the late war, received their first knowledge of tactics in this military school. Boston was settled as early as 1631, from Charlestown; it was called Shaumut by the Indians; Trimountain by the settlers in Charlestown from the view of its three hills; and had its present name in token of respect to the Rev. Mr. Cotton, a minister of Boston in England, and afterwards minister of the first church here. Boston was greatly damaged by an earthquake on October 29, 1727, and since that time has suffered severely by numerous fires, the houses being mostly built of wood. The last large fire happened July 30, 1794, and consumed 96 houses, ropewalks, etc., and the account of losses given in by the sufferers amounted to 209,861 dollars. It was in Boston that the Revolution originated which gave independence to America, and thence flew like an electrical shock throughout the Union. It suffered much at the commencement of the war, by the loss of an extensive trade, and other calamities. Boston feels a pride in having given birth to Benjamin Franklin, and a number of other patriots, who were among the most active and influential characters in effecting the revolution. Great improvements have been made in the streets, buildings, and police of this town, within a few years.

A Selected Bibliography of Boston and Vicinity

Arranged by the Teachers' Geography Club of Boston

Boston Illustrated. By Edwin M. Bacon. Size, 6 x 5; pp. 156; Illus., 100; Maps, 5; Price, $0.50. Boston: Houghton, Mifflin & Co., 1903.

There is no better guide to Boston. The descriptions of noted localities are concise and accurate, the directions clear, and the maps unusually good.

Walks and Rides in the Country about Boston. By Edwin M. Bacon. Size, 6½ x 5; pp. 419; Map. Boston: Houghton, Mifflin & Co., 1900.

This volume, as well as *Boston Illustrated*, is published for the Appalachian Mountain Club and contains very full accounts of trips to all the places of interest around Boston. It is absolutely trustworthy in its directions and descriptions.

King's Handbook of Boston Harbor. By M. F. Sweetser. Size, 6 x 4; pp. 266; Illus., 13. Cambridge: King, 1882.

This volume contains a very good description of the islands, forts, lighthouses, hotels and pleasure resorts of the harbor.

Topographical Model of Metropolitan Boston. By G. C. Curtis. Size, 10 x 6; pp. 37; Illus., 7. Boston: Wright and Potter, 1900.

The picture of the topographical model which forms the frontispiece of this book is nearly as good as the model itself, and the descriptions of the topography of Metropolitan Boston are the best yet published.

Old Landmarks of Boston. By Samuel Adams Drake. Size, 10 x 6; pp. xviii, 484; Illus., 16. Boston: Little, Brown & Co., 1900.

This volume gives a very full account of old Boston, and points out accurately

what may still be seen of the old landmarks. The older work has been carefully revised and brought up to date in this 1900 edition.

Chapter VII. contains information about Copp's Hill and its vicinity, the present North End of Boston. Chapters X. and XI. are devoted to a tour around the Common and describe the origin of this breathing space in the midst of a great city and its immediate surroundings both past and present.

Boston Town. By Horace E. Scudder. Size, 10 x 6; pp. 243; Illus., 21. Boston: Houghton, Mifflin & Co., 1881.

This is a book written for children; it is a collection of historical tales of old Boston. Some of the headings of the chapters are given below and will give an idea of the scope of the book, which is written in Mr. Scudder's usual entertaining style.

Chapter IV. A Day with John Winthrop. Chapter VIII. The Province House. Chapter IX. A Boston Boy of the Last Century. Chapter X. Faneuil Hall and Sam Adams.

Historic Boston. By Edward Everett Hale. Size, 9 x 5; pp. 179; Illus., 24. New York: D. Appleton & Co., 1901.

Chapter VII. gives a short description of historical things not often mentioned in the guide books and makes it possible for strangers to find their way to the different places mentioned.

Chapter IX. gives some interesting facts about the derivation of names of Boston's winding streets, taken in alphabetical order. There is also a chapter on Harvard College at Cambridge.

The Memorial History of Boston, 1630-1880. By Justin Winsor. Vol. 4; Size, 11 x 7½. Boston: James R. Osgood & Co., 1881.

Vol. 1, pp. xxxii, 596; Illus., 76; Maps, 18.
Vol. 2, pp. lviii, 576; Illus., 70.
Vol. 3, pp. xii, 691; Illus., 103; Maps, 12.
Vol. 4, pp. x, 713; Illus., 87; Maps, 2.

This is the most comprehensive work upon Boston that has been published. It takes up in succession, The Prehistoric Period, The Early History, The Colonial Period, The Provincial Period, The Revolutionary Period, The Last Hundred Years, and closes with Special Topics, treating of education, science, libraries, etc. The map in the beginning of the first volume gives a clear idea of Boston, old and new, and the chapters in each period upon the topography and landmarks of that period are especially noteworthy.

Geology of the Boston Basin. By William O. Crosby. Vol. 1, Part III; the Blue Hills Complex. Size, 9½ x 6½; pp. 405; Illus.; numerous maps and plates. Boston: Boston Society of Natural History, 1900.

To any student of geology, this book will give a full and authoritative description of the geology of the Boston Basin region as at present understood by geologists. The pages on the topography, 293-298, describe briefly what this region now is and how it was formed. The fossil plates are numerous and valuable.

Other reliable books, chiefly of historic interest, are the following:

Boston. By Henry Cabot Lodge. New York: Longmans, Green & Co., 1892.

Story of Boston. By Arthur Gilman. New York and London: G. P. Putman's Sons, 1894.

History of the Siege of Boston. By Richard Frothingham. Boston: Little, Brown & Co., 1896.

Life and Times of Joseph Warren. By Richard Frothingham. Boston: Little, Brown & Co.

Historic Pilgrimages in New England. By Edwin M. Bacon. Boston: Silver Burdett & Co.

Papers on Geography and Related Subjects

To be Given at the Meeting of the National Educational Association in July, 1903

FROM PRELIMINARY OFFICIAL PROGRAM

General Session, Thursday evening, July 9. *The Nature Study Movement.* L. H. BAILEY, Professor of Horticulture, Cornell University, Ithaca, N.Y.

Department of Elementary Education, Tuesday morning, July 7. *Nature Study True to Life.* C. F. HODGE, Clark University, Worcester, Mass.

Department of Business Education, Wednesday morning, July 8. *Commercial Geography; The New Science—Its Practical Value, Character, and Place in the Course.* FRANK O. CARPENTER, English High School, Boston, Mass.

Department of Science Instruction, Thursday morning, July 9. *Practical Methods in the Teaching of Geology.* N. S. SHALER, Professor of Geology, Harvard University.

Out of Door Class Work in Geography. DR. F. P. GULLIVER, St. Mark's School, Southboro, Mass.

Some Practical Methods of Geography Teaching in the Grades. MRS. L. A. HITCHCOCK, Meriden, Conn.

Statistics of Boston from the Census of 1900

Population, 1900	560,892
Increase since 1890	112,415
Native population	363,763
Foreign born	197,129
Whites	548,083
Negroes	11,591
Chinese	1,186
Japanese	29
Indians	3

Relative size, 5th city in United States.

Leading industries in order of value of products:

1. Sugar and molasses refining.
2. Printing and publishing, newspapers and periodicals.
3. Foundry and machine shop products.
4. Men's clothing, factory product.
5. Printing and publishing, book and job.
6. Malt liquors.

Number of manufacturing establishments, 7,247, being fifth in rank.

Capital invested in manufacturing, $143,311,376, being seventh in rank.

Value of products from manufacturing, $206,081,767, being sixth in rank.

Imports for seven months ending January, 1902, $38,478,846 being second in U. S.

XUM

Exports for seven months ending January, 1902, $67,915,907, being third in U. S.

Principal exports for seven months ending January, 1902:

Corn, 2,890,595 bushels, being fourth in U. S.
Wheat, 8,550,415 bushels, being seventh in U. S.
Flour, 946,589 barrels, being fifth in U. S.
Cattle, 49,589, being second in U. S.
Canned beef, 1,105,365 pounds, being sixth in U. S.
Fresh beef, 67,445,209 pounds, being second in U. S.
Bacon, 44,557,900 pounds, being second in U. S.
Ham, 59,446,691 pounds, being first in U. S.
Pork, 42,711,442 pounds, being first in U. S.
Lard, 48,417,433 pounds, being second in U. S.
Butter, 2,591,743 pounds, being second in U. S.
Cheese, 3,497,806 pounds, being second in U. S.
Cotton, 53,506,601 pounds, being eighth in U. S.

Oystering in Hampton Roads.—The most extensive natural oyster beds of the world are to be found in the states of Virginia and Maryland. In Chesapeake Bay and in the rivers that flow into it there are thousands of acres of "oyster rock" which are the property of these two states and are known as the public lands. Those belonging to Virginia were surveyed in 1894 by Lieutenant Baylor of the United States Coast Survey, the grounds being staked off by three commissioners for each district, appointed by the judge of the adjacent county. For years the natural oyster beds were inadequately protected by the state, and suffered so severely from the unrestricted use of dredges and tongs that the oyster grounds were in danger of being entirely depleted. The charting of the natural beds by Baylor's Survey and the enactment of new oyster laws, with the amendments added from time to time, have served to greatly stimulate the oyster industry and to protect the natural beds of the state. All the grounds contained within the limits of Baylor's Survey are known as the natural rocks or beds and are claimed by the state for public lands. Upon these any person may take oysters with tongs during the season by obtaining a license, and on certain portions of these grounds dredges also may be used, on the same condition. Outside of these limits the bottoms may be rented from the state by any resident, for the purpose of planting and propagating oysters, at the rate of one dollar per acre per year for a term of twenty years, each assignment being limited to two hundred and fifty acres.

The average inland citizen may not know that oysters are planted, cultivated, and harvested like any other crop, a person who engages in this industry being known as an oyster planter. Thousands of acres of oysters are under cultivation in Hampton Roads, which, during the harvesting season, is often literally alive with the reaping machines of the oystermen. These are tongs and dredges made of iron, and worked by hand or steam power from canoes and from the decks of sail or steam boats. When one wishes to engage in the oyster business he goes to the inspector of his district and leases a certain number of acres of river bottom. He then stakes out his "land", and divides it into squares which correspond to the fields of the ordinary farmer. Next, he buys "seed" from some oysterman who is licensed to take oysters on the public lands, which lie, for this section of Virginia, in the James river. Seed oysters should be, as nearly as possible, round and single; they vary from the size of a ten-cent piece to that of a dollar, and are sold on the beds at an average price of twenty-five cents a bushel. These are sown as evenly as possible by being shoveled overboard from the deck of the vessel as it is sailed back and forth over the square or field to be planted, from four to five hundred bushels of seed oysters being placed on an acre. Different squares are planted in different years. "Seed" is usually sown in the fall, though it may be done at any time between September first and May first, the remainder of the year being the spawning season. When the oysters are from one and a half to two years old, they are usually large enough to be sold, and; as a rule, part of them are sold at this age and the balance in the third or forth year, after which time the ground is allowed to rest a year before being planted again. Great care must be exercised in the selection of bottoms for oyster planting, if the planter would be financially successful. The oyster will thrive best on a bottom with a soil between clay and sand. If it is too soft, the oysters will sink in the mud and be smothered; if too sandy, the sand will enter the shells and kill them. Care must be taken also that the bottom is not a shifting one and that it is accessible to a good tide, for upon the tide the oyster depends, to a large degree, for its food. During the oyster season—the months that have *r* in their names—the picturesque canoes follow each other out of the rivers, running before the wind or, close hauled, sailing into the teeth of it. Or, again, they are sculled out over the glassy water or taken in tow, with the large schooners, by the steam dredging boat of some energetic oyster planter, anxious to get his fleet at work on Hampton Bar. All day they plant or harvest, in fair weather or foul,

XUM

in freezing or balmy air, amid icy winds or in the dead calm of a warm sunny day. At evening they come sailing or sculling into the harbor in the red glow of the sunset light.

Oysters are harvested in three different ways. In small boats and in shallow waters, oyster tongs are used. These are shaped like a pair of huge pincers, the size varying somewhat with the depth of water and the abundance of the oysters on the bottom. At their lower ends are iron teeth that hold the oysters in their grasp when the tongs are brought to the surface. As a rule, the tongers in this section of Virginia are negroes; they usually own their own boats and either tong for themselves under a license on the public lands or work on the large oyster grounds of the planters, who pay them ten cents a bushel for catching the oysters. About one hundred of these boats are owned by negroes living in the vicinity of the town of Hampton. On the larger boats—schooners and sloops—two dredges are used, one on each side of the vessel; these are dragged over the bottom at the end of a rope, the other end of which is attached to a drum turned by a crank on the deck. Oyster planters usually supplement the work of the tongers and hand dredgers whom they employ by using steam dredges. The most powerful of these now in use in Hampton Roads is able, with two ten-bushel dredges moved by steam, to take about twelve hundred bushels in three or four hours when working on a bed of "thick" oysters. With a hand dredge, from fifty to four hundred bushels can be taken in a day, the number depending upon the wind and the quantity of oysters on the bed; while tongers catch from fifteen to seventy-five bushels in the same time. The steam dredge boat also has the advantage of being able to reach the oyster beds quickly. On one occason when the wind was light, the writer noticed that a schooner which had started from the wharf in Hampton before the steam dredge left, had not reached an oyster bed nearer home than the one being worked by the steamer, when the latter had headed for the harbor with her load—the result of five hour's work.

The largest steam dredge in Hampton Roads is owned by Mr. Frank W. Darling of Hampton, and is eighty feet in length and of fifty-six tons' burden. It has a crew of twelve men, including the captain and engineer, and is able to carry a load of thirteen hundred bushels of oysters. A trip to Hampton Bar on this boat is full of interest. The start is made before dawn, breakfast as well as dinner being served on board. Crabs are often caught in the dredges, and these with the oysters made acceptable additions to the excellent bill of fare

offered the visitor. The steamer moves slowly over the bed that is being worked, lowering the dredges first on one side and then on the other and bringing them up to the deck full of oysters, which are dumped out and shoveled into piles "forrard" and amidships. The dredge itself is an iron framework from four to six feet wide on the tooth-bar, having sides converging to a point at the end, where a rope or chain is attached by which it is drawn over the bottom by the vessel. Strong, wedge-shaped iron teeth attached to the tooth-bar and projecting downward two inches, drag the oysters from the bed into a bag of rope and chain which stretches out behind, being fastened at the bottom to the tooth-bar and at the top and sides to the framework of the dredge. As the visitor sits idly on deck watching the men who are shovelling the oysters onto the steadily growing piles, large flocks of ducks of many varieties circle and cry about the boat, diving, swimming and flying in close range; schooners loaded with Virginia pine and turpentine or with coal from the Virginia coal fields and bound for Northern cities are continually passing; oyster canoes and sloops are at work here and there; and, afar off, passenger steamers ply to and fro past the quarantine boat and a ship of the white squadron lying at anchor off Old Point.

By one o'clock about one thousand bushels of oysters are stowed on board and the dredge heads for home. Arriving at the packer's wharf, the oysters are shoveled into wheelbarrows and carried into the shucking room of the packing house. Here are long rows of "shuckers"—negro men who sing at their work as they stand before the stalls where they dump their oysters and open them with strong oyster knives. Good shuckers can open from twelve to twenty gallons a day. They are paid nineteen cents a gallon and earn from eight to fifteen dollars per week. The largest packer in Hampton, Mr. Darling, opens from 100,000 to 200,000 bushels of oysters in a year. In this house, as the men open the oysters, they drop the shells on an inclined plane from which they slide into a trough and are carried along by scrapers attached to an endless chain called a "shell conveyor," which takes them without further labor to the shell pile in the yard. When a shucker has filled his gallon measure, he carries it to the strainer, where the oysters are strained and measured. They are then emptied into large casks kept full of fresh water, by means of which any loose shell or grit is washed out. From these casks the oysters are dipped into a second strainer and when separated from the water are again measured and packed in twenty-five gallon packing barrels painted inside with a paint prepared

especially for this purpose. In these they are shipped to Baltimore and Northern markets. The shells are sold for from one to three cents a bushel and are used extensively by oyster planters for the propagation of oysters. They are placed in small piles on grounds found suitable for the purpose, where the spat or small oyster will attach itself to the shells. They are also used for making shell lime and for building the excellent shell roads found in some parts of the Virginia peninsula.—*The Southern Workman*, Vol. XXXII, No. 3, March, 1903.

Current Articles on Commerce and Industry

Agriculture, Use of Motors in (Illus.), *Sci. Am. Supp.*, April 11.
Australia's Land-grant Railway, *Rev. of Revs.*, April.
Canada, Trans-Canadian Railway (Illus.), *Rev. of Revs.*, April.
Cattle King, The Passing of the (Illus.), *World To-Day*, April.
Cattle Raising in the South (Illus.), *Southern Field*, March.
Coal, Award of Coal Strike Commission, *Rev. of Revs.*, April.
Coffee Industry, *Bradstreet's*, April 18.
Copper, Silver and Gold in Latin America, *Cons. Repts.*, April.
Cities, Building to Order (Illus.), *World's Work*, April.
Cuba, Brick Making in, *Clay-Worker*, April.
Fisheries of the North Sea, *Cons. Repts.*, April.
Forestry and the Lumberman, *Miss. Valley Lumberman*, April 24.
Forests of Canada, *Cons. Repts.*, April.
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Greece, Clay-Working Industries of, *Sci. Am. Supp.*, April 18.
Honduras To-day (Illus.), *World To-Day*, April.
Inventors, The U. S. a Nation of, *World's Work*, April.
Ireland, Hope for the Farmer of, *Rev. of Revs.*, April.
Locomotives, *Sci. Am.*, April 18.
Louisiana Purchase (Illus.), *World's Work*, April.
Ohio, A Century of (Illus.), *Rev. of Revs.*, April.
Panama Canal (Illus.), *Bull. Intern. Bureau of Am. Repubs.*, April.
Philippines, Forests of, and Rubber and Gutta-Percha in, *Mo. Summary of Comm. of Philippine Is.*, November, 1902, (current number).
Rugs of the Transcaspian Countries (Illus.), *Sci. Am. Supp.*, April 25.
Sisal, The Yucatan Fiber (Illus.), *Cons. Repts.*, April.
Soap Making, *Sci. Am. Supp.*, April 4.
Statistical Abstract of the World, *Mo. Summary of Comm. and Finance*, April.
Transporting New York's Millions (Illus.), *World's Work*, April.

EDITORIAL

GEOGRAPHICAL BOSTON

CHARLES W. ELIOT
President of Harvard University, and President of the National Educational Association, 1902-3.

THE meeting of the National Educational Association at Boston next month offers a chance to visit this historic city that should not be neglected by any one who can avail himself of the opportunity. Geographically the meetings of the Association have little to offer, as will be seen from the program printed in this number. On the other hand the trip to Boston and the possible excursions about Boston give teachers an opportunity to see much of deep interest to them professionally.

Boston is not only placed in the midst of varied and striking geographic surroundings, but in only one other place in the country is there so much of interest historically. The James river of Virginia and Massachusetts Bay were the cradles of the early English civilization of this country, and both abound in localities of deep interest to all Americans. Nowhere else in this country can one feel the inspiration of his historic surroundings as in these two regions.

From the early colonization to the Revolution, Boston and its vicinity were the constant seat of activity, self-sacrifice, and stirring deeds. To follow the route of the soldiers from Boston to Concord, to visit the battle grounds at Concord or Lexington, or any other historic spot, is to take oneself in thought and almost in feeling back to the beginnings of our independence, and to learn unconsciously lessons in patriotism more inspiring and lasting than can be gained from any amount of reading, unless one is unusually keen in historic imagination.

To enable our readers to know what is most interesting about Boston in the two related fields, geography and history, this number has been planned and arranged. We have not tried to present a complete statement of what should and can be seen of interest to all, for that is impossible. Hence we have attempted to outline what no one can afford to miss and have especially tried to show what can be seen by the way, without special excursions.

RECENT PUBLICATIONS

The Statesman's Year-Book for 1903. Edited by J. Scott Keltie. Pp. xxlviii, 1363. London: Macmillan & Co., 1903.

The leading annual dealing with the economic and social conditions of the states of the world. Complete, accurate, up-to-date and invaluable. The edition for 1903 contains maps showing the new boundary between Chile and Argentine Republic, the new Abyssinian boundary, the transcontinental railways (present and proposed) of Eurasia, and diagrams showing graphically the comparative standing of different countries in merchant shipping, output of iron ore, etc.

The Place of Industries in Elementary Education. By Katharine Elizabeth Dopp. Pp. 208. Chicago: The University of Chicago Press, 1903.

An interesting appeal for the teaching of industrial life in elementary schools, based upon psychology and racial history. The chapter on the Significance of Industrial Epochs is particularly suggestive.

Descriptive Geography from Original Sources.—Europe. By F. D. and A. J. Herbertson. Pp. xxiv, 299. London: A. & C. Black, 1903.

A companion volume to the series noted in this JOURNAL for February, 1903, p. 112. Useful and interesting for collateral reading. The introductory chapter presents a very helpful summary of the geography of Europe.

Hans the Eskimo. By Christiana Scandlin. Pp. 125. New York: Silver, Burdett & Co., 1903.

An idealized account of the life and adventures of Hans Christian, an Eskimo employed by Dr. Kane in his Arctic expedition of 1853-55. A worthy rival of the several well known volumes dealing with the life of children in the far north.

The Nature Study Idea. By L. H. Bailey. Pp. 159. New York: Doubleday, Page & Co., 1903.

A graphic exposition of the meaning of Nature Study, valuable for giving a point of view in elementary geography work. Full of suggestion for all open-minded teachers.

NEWS NOTE

Expedition to Bermuda.—The recently organized Geographical Society of Baltimore has just sent out a fully equipped scientific expedition to the Bahamas. The expedition is under the general direction of Dr. George B. Shattuck of the Johns Hopkins University; and the staff includes specialists in all the branches of science that may be studied on the islands. A careful study will be made of the geology and geography, the marine and land zoology, the botany, the climatology, the soils and the tides of the region. The expedition is supplied with all the necessary scientific instruments for exact work and its results will undoubtedly be of great present and permanent value.

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